

1 STATE OF MINNESOTA DISTRICT COURT
2 COUNTY OF RAMSEY SECOND JUDICIAL DISTRICT
3 - - - - -
4 The State of Minnesota,
5 by Hubert H. Humphrey, III,
6 its attorney general,
7 and
8 Blue Cross and Blue Shield
9 of Minnesota,
10 Plaintiffs,
11 vs. File No. C1-94-8565
12 Philip Morris Incorporated, R.J.
13 Reynolds Tobacco Company, Brown
14 & Williamson Tobacco Corporation,
15 B.A.T. Industries P.L.C., Lorillard
16 Tobacco Company, The American
17 Tobacco Company, Liggett Group, Inc.,
18 The Council for Tobacco Research-U.S.A.,
19 Inc., and The Tobacco Institute, Inc.,
20 Defendants.
21 - - - - -

22 TRANSCRIPT OF PROCEEDINGS
23 VOLUME 13, PAGES 2370 - 2572
24 FEBRUARY 5, 1998
25

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DIRECT EXAMINATION - DR. CHANNING ROBERTSON

1 P R O C E E D I N G S.
2 THE CLERK: All rise. Ramsey County
3 District Court is again in session, the Honorable
4 Kenneth J. Fitzpatrick now presiding.
5 (Jury enters the courtroom.)
6 THE CLERK: Please be seated.
7 THE COURT: Good morning.
8 (Collective "Good morning.")
9 MR. CIRESI: Good morning, ladies and
10 gentlemen.
11 (Collective "Good morning.")
12 BY MR. CIRESI:
13 Q. Good morning, doctor.
14 A. Good morning.
15 Q. Doctor, can you turn your attention, please, to
16 Exhibit 11907 in volume one. This is a Liggett
17 document dated July 16th, 1976, authored by Mr. V.
18 Norman from the research department on the subject of
19 modification of smoke pH, and directed to Mr. R. L.
20 Kersey, K-e-r-s-e-y, director of research.
21 Is this one of the documents that you reviewed
22 in this litigation?
23 A. Yes.
24 Q. And does it form part of the basis of your
25 opinion?

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1 A. It does.
2 Q. And with respect to the subject matter
3 referenced therein, is it consistent with other of

4 the documents that you've reviewed in this
5 litigation?

6 A. Yes.

7 MR. CIRESI: Your Honor, we would offer
8 Exhibit 11907.

9 MR. BERNICK: No objection, Your Honor.

10 THE COURT: Court will receive 11907.

11 BY MR. CIRESI:

12 Q. We have up first page on, which shows that it's
13 directed to Mr. Kersey, and Mr. Norman's name is
14 there. It's also on the last page. And the date is
15 in the upper right-hand corner, 7/16/76, and the
16 title "Modification of Smoke pH."

17 In the first paragraph, doctor, is there a
18 reference therein by Mr. Norman with respect to the
19 effect of pH on the rapidity with which nicotine
20 transfers into the smoker's blood?

21 A. Yes, there is.

22 Q. And what is reported by Liggett's Mr. Norman in
23 1976?

24 A. Indicates "The rapidity with which the nicotine
25 transfers into the smoker's bloodstream is strongly

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2373

1 influenced by whether it is in the salt form," which
2 is the charged form or ionized form, "or a free
3 base," which is the uncharged or unionized form, "the
4 latter being absorbed approximately five times as
5 fast."

6 Q. And at the end of that paragraph the statement
7 is made that "Small adjustments of smoke pH result in
8 large shifts in the proportion of free nicotine." Do
9 you see that?

10 A. Yes.

11 Q. Can you describe why that is.

12 A. Well as we saw yesterday, the -- the form in
13 which nicotine resides, either the uncharged or the
14 charged form, depends on -- on pH, and in fact the
15 relative amounts depend on pH, and we've seen that
16 the pH scale goes from zero to 14, with pH seven
17 being in the middle and being neutral, but each step
18 on the pH scale represents a factor of ten difference
19 in the hydrogen ion concentration or the relative
20 acidity or basicity in terms of actual numbers of
21 ions that are contributing to it. It's very much
22 like the Richter Scale for earthquakes where if you
23 have a -- have an earthquake of magnitude three
24 versus an earthquake of magnitude four, well the one
25 at magnitude four releases ten times more energy than

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2374

1 the one at magnitude three. And so when you're in
2 the range of pH where you're having this effect on
3 the amount of free base versus the amount of charged
4 material, small changes in the pH which are
5 represented -- can be represented by substantial
6 changes in the shift in the equilibrium. So you --
7 you have to be mindful of that and not think, well,
8 if the pH changes from 5.8 to 6.2, that's not going

9 to do very much, it doesn't sound like a very big
10 change. But in fact it can have substantial changes
11 on the relative amounts of those two compounds.

12 And it's right in the range of pH, high fives
13 and into six and seven, that this curve starts to
14 become very steep. Things are changing very rapidly
15 in response to changes or even small changes in the
16 pH.

17 Q. And doctor, in the second paragraph and the
18 third paragraph, does Mr. Norman address the issue
19 that you referenced yesterday with regard to the
20 recipe nature of the business on what we saw in
21 Exhibit 10110, the Lorillard document?

22 A. Yes, he does.

23 Q. Can you describe what's referenced there by Mr.
24 Norman.

25 A. Well he states it pretty clearly. He says that
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2375

1 "Choosing an optimum smoke pH is complicated by other
2 basic materials in smoke" -- remember, smoke contains
3 thousands and thousands if not tens of thousands of
4 other chemicals -- "and some of these other chemicals
5 may also undergo the same salt to free base
6 transition over an overlapping pH range." So there's
7 other equilibrium between other kinds of molecules
8 that are present in the smoke. Now "Unlike nicotine,
9 where the transition causes no significant change in
10 the acute flavor impression" -- that is, he's saying
11 that the relative amounts of free base to protonated
12 seem not to have strong influences on -- on taste,
13 says, "some of the other free basic materials impart
14 significant cigar-like and harsh taste notes to
15 smoke. The effect of an increased proportion of free
16 nicotine per se, would not be expected to be acutely
17 perceptible," that would be in terms of changing
18 taste, "but it would show up as a sensation of
19 satiation after having smoked a number of
20 cigarettes," again, pointing to the effect that free
21 base has in terms of its rapidity of transport and
22 its rate of getting to the neuroreceptors.

23 So the affirmation here is that when you're
24 dealing with such a complex chemistry, one has to
25 take many, many of the variables that go into the

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2376

1 design of a cigarette into account. These have to be
2 brought into balance in order to develop a final
3 acceptable product.

4 Q. And in the paragraph starting at the bottom,
5 does Mr. Norman address that issue?

6 A. He says, "Thus, because of taste effects of
7 other bases" -- these other components in
8 smoke -- "one is not completely at liberty to choose
9 a pH that is optimum," just for nicotine, "and a
10 compromise has to be reached as to how much free
11 nicotine is adequate and how much of the basic taste
12 complex can be tolerated." So he's talking about a
13 compromise here. And designs are always full of

14 compromises; can't always have what you want without
15 causing a problem somewhere else, and so you have to
16 balance these -- weigh these against one another
17 and -- and come to a proper balance.

18 Q. And doctor, then in the first full paragraph,
19 does Mr. Norman address some of the design parameters
20 that may or may not affect pH?

21 A. Well he points out that "Smoke pH can be
22 adjusted by," for instance, "changing the tobacco
23 blend," that is, adding more burley would tend to
24 raise the smoke pH, or putting additives in the blend
25 or additives even in the filter. So there's a number

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2377

1 of tools available to the designer to reach as
2 appropriate and as optimal a level of delivery as one
3 can and still have the product be accepted.

4 Q. Doctor, in the review of the documents that you
5 made, did your review indicate whether or not the
6 defendants researched whether or not the changing of
7 pH would enhance the transfer of nicotine from the
8 tobacco to the smoke?

9 A. Yes, they did. They -- they investigated the
10 effect that adding ammonia compounds to tobacco and
11 tobacco constituents that are in a cigarette would
12 have on causing a more favorable release of nicotine
13 from the solid material into the -- into the smoke
14 during combustion, pyrolysis, and distillation
15 process.

16 Q. Why is nicotine transfer important from the
17 standpoint of cigarette design?

18 A. Well you have a certain amount of nicotine in
19 a -- in the reservoir, and you want to transfer a
20 certain fraction of that into the smoke in order to
21 be able to deliver the appropriate amount to the
22 recipient, particularly to ensure that you're
23 following this dose window of pharmacologic activity,
24 and so if you're delivering, for instance, ten
25 percent or 15 percent of the available nicotine into

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2378

1 the smoke, a few-percent increase in that could have
2 a dramatic effect in terms of the increased
3 percentage of nicotine delivery, if in fact that was
4 one of your goals, to -- to extract a higher
5 percentage of the nicotine available in the reservoir
6 to the recipient.

7 And again, that would be done in the context of
8 ensuring that you land in this dose-range window that
9 we've been talking about and not drop below it.

10 Q. With regard to the nicotine transfer, doctor,
11 can you direct your attention to Exhibit 10182, which
12 is a Lorillard document dated January 12th, 1983 --
13 1973, and that is also in volume one. Exhibit 10182.

14 This is a document on Lorillard letterhead
15 directed to Mr. C. L. Tucker, director of product
16 development, from Dr. A. M. Ihrig, senior research
17 chemist, subject, "THE CHLOROFORM EXTRACT."

18 Is this one of the documents that you reviewed

19 with respect to the testimony you're giving in this
20 case?

21 A. Yes, it is.

22 Q. Is it one of the documents that forms part of
23 the basis of your opinion?

24 A. Yes.

25 MR. CIRESI: Your Honor, we would offer
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2379

1 Exhibit 10182.

2 MR. BERNICK: No objection, Your Honor.

3 THE COURT: Court will receive 10182.

4 BY MR. CIRESI:

5 Q. Doctor, in the second paragraph, does Dr. Ihrig,
6 the senior research chemist at Lorillard, address the
7 issue of nicotine transfer?

8 A. Yes, he does. He was --

9 Apparently they were doing some experiments
10 adding a chloroform extract to tobacco. The free
11 base form of nicotine will partition into chloroform,
12 which is an organic solvent, so this would be, you
13 know, simply adding nicotine back into the -- back
14 into the tobacco. And he points out that "An
15 investigation at the Lorillard Research Center found
16 that adding nicotine to burley casing" -- so here is
17 a situation where nicotine is being put into the
18 ingredients for the burley casing, and then normally
19 it's sprayed on -- "did not increase the nicotine
20 delivery beyond the predicted amount." Goes on to
21 say that "Since only ten percent of the nicotine is
22 transferred to the mainstream smoke," and in this
23 case, "any increase in the efficiency of nicotine
24 transfer would lead to a dramatic change in the
25 nicotine level and provide our company with another

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2380

1 means for controlling nicotine delivery.

2 So these experiments at enhancing nicotine
3 transfer was directly aimed at nicotine control and
4 the control of nicotine delivery.

5 Q. Doctor, can you direct your attention now to
6 Exhibit 13263, which would be in volume two of the
7 exhibits.

8 This is a B&W document dated October 28th, 1985,
9 referring to a presentation that was made. Is this
10 one of the documents that you reviewed, doctor?

11 A. Yes, it is.

12 Q. Does it form part of the basis of your opinion
13 in this case?

14 A. Yes.

15 Q. And does it address issues that were addressed
16 in the documents of the other defendants in this
17 case?

18 A. It does.

19 MR. CIRESI: Your Honor, we'd offer Exhibit
20 13263.

21 MR. BERNICK: No objection.

22 THE COURT: Court will receive 13263.

23 BY MR. CIRESI:

24 Q. The B&W document shows on the front it's a BATUS
25 presentation, October 28th, 1985, marked
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2381

1 "CONFIDENTIAL." Then if you'd turn to the first
2 page, is there stated therein the subject matter of
3 the BATUS presentation?

4 A. Well it deals with five-year plans and
5 objectives, and the bullet headings are corporate
6 goals and strategies, a technology review, a
7 five-year engineering plan for the company, and long
8 range R&D.

9 Q. And doctor, could you turn to the page that
10 bears the Bates numbers, last three, 012, and is
11 there reflected therein 1986 plans regarding key
12 smoke quality developments?

13 A. Yes.

14 Q. And can you describe what's being depicted on
15 that page, please.

16 A. Well in the center are the words "SUPERIOR
17 PRODUCT QUALITY," and around it with arrows pointing
18 to that would be the, in my mind, the issues that
19 these folks felt were important in determining
20 superior product quality, and this would include
21 reconstituted tobacco, which we've talked about
22 yesterday, the -- the leaf or the materials, the raw
23 materials that would be brought in, tobacco plants
24 that would be chosen, ammonia, which would be used in
25 these ammoniation processes to control pH, process

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2382

1 improvements in the plants, analytical, meaning new
2 methods to assay the final product to help them
3 ensure appropriate quality control and quality --
4 quality assurance on the items that they're
5 interested in measuring, both physical and chemical
6 presumably, changes in the cigarette design, and as
7 we saw that would include such things as the papers
8 that are used, the filters, the degree of
9 ventilation, how firmly or how much tobacco is put in
10 and what -- what proportions of the different tobacco
11 materials, and reverse engineering, which refers to
12 taking competitors' products and disassembling them
13 and analyzing them in any way you -- you can to try
14 and learn what it is they're doing that you might not
15 be doing that could be helpful to improving your own
16 product.

17 Q. Doctor, with regard to reverse engineering, what
18 if anything did you observe regarding that
19 undertaking by other defendants based on your review
20 of the documents?

21 A. Well it's pretty clear everybody was reverse
22 engineering everybody else. They would always be
23 looking -- each -- each company would be looking at
24 their competitors' materials and assaying them and
25 trying to understand what the ingredients were, the

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1 kinds of tobaccos, how much reconstituted material,
2 what kind of reconstituted material, what kind of
3 paper, what kind of filter and -- and so forth,
4 always making comparisons of their products with
5 products of the competitors.

6 And the last is casing and flavor, and as we
7 discussed yesterday, this is where additors can be
8 placed on the tobacco material to achieve part of
9 this overall balance in the design that we've been
10 talking about in terms of sensory perception, taste,
11 aroma and -- and the like.

12 Q. And can you turn to the next page, then, which
13 is 013, and are the major programs for nineteen
14 ninety -- 1986 set forth therein?

15 A. Well these three programs, leaf, reconstituted
16 and ammonia, were on the -- were on the previous
17 page, and so this is just a break-out of some of the
18 issues under each of those categories that they were
19 interested in -- in pursuing.

20 Q. And then if you turn to the next page, which is
21 014, can you describe what is being depicted on that
22 page?

23 A. Well this is a chart that has at its --
24 essentially at its peak is ammonia, and if you'll
25 recall on the previous page ammonia was one of the

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1 important issues to them with regard to
2 superior-quality product. And if you go to the
3 right, it goes -- it points to something called DAP,
4 which is diammonium phosphate, which is one of the
5 ammonium compounds that the manufacturers use in
6 their ammoniation. And then that comes down and
7 splits to the left and to the right. And to the left
8 it goes frees pectin, combines with nicotine, as in
9 the Philip Morris-type reconstituted material -- this
10 would be the slurry process or the band cast type of
11 material, that then is, of course, combusted at some
12 point in the cigarette. And the outcome of that
13 having added ammonia in the form of DAP results in
14 improved nicotine transfer. So ammonia treatment
15 affects the nicotine transfer, the release of
16 nicotine from the material, and improves it.

17 And to the right, where it says "'NEW'
18 INORGANICS," what they're referring to there is
19 during the combustion process -- DAP, by the way, is
20 an inorganic material -- you liberate ammonia,
21 diammonium phosphate has ammonia in it, as the name
22 would imply, and when you liberate the ammonia, it
23 goes to the left. So the addition of DAP to liberate
24 ammonia, and you go to the left, says alter smoke pH
25 and points out that Philip Morris has higher smoke

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1 pH, and then it goes down and shows reduced
2 irritation, indicating that one of the outcomes of
3 having added DAP, when you finally get to the bottom,
4 is expected to be reduced irritation of some sort.

5 If you go to the right where it says "REACTS
6 WITH VOLATILES (FAST CHEMISTRY)," and again "REDUCED
7 IRRITATION," seems to be referring to aldehyde-type
8 materials or irritant carbonyls which are known to
9 cause irritation, and the inference here is that such
10 reactions attenuate the effect that those carbonyls
11 have, and therefore the outcome is reduced
12 irritation. So those are the positive things that
13 flow out of having ammoniated the material.

14 But if you go to the left, at the top again,
15 you'll see that the arrow points to ammonia and
16 sugar, and it's known that when you combust sugars in
17 the presence of ammonia compounds, that the
18 decomposition products that result from having
19 thermally decomposed the sugars is that these
20 pyrosynthesis reactions will occur, which is the
21 recombination of some of the sugar or sugar fragments
22 with ammonia and the creation of new -- new
23 molecules, molecules that weren't in the cigarette
24 before it was burned. And so this is put into the
25 category of reaction complexes, referring to the

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2386

1 number of new substances, e.g., Philip Morris
2 compound, and then in writing it says "Groups of
3 Flavor Compounds," and it talks about methyl
4 pyrazine. So these are the positive aspects of
5 reacting ammonia with the tobacco in that in the
6 combustion process some of the ammonia will be
7 reacting with the sugars, and if things work out,
8 you'll end up with some of these pyrosynthesis
9 compounds that actually could enhance or make the
10 cigarette more flavorful, and so they talk about
11 better smoke flavor and increased body.

12 Q. Doctor, could you turn to page 25 of this
13 document. And does this page address the design-
14 parameter implications on the pharmacology of the
15 cigarette?

16 A. Yes. This -- this cartoon is labeled
17 "CHEMOSENSORY RESEARCH." It quite -- quite
18 effectively shows what's happening in terms of
19 relating the -- this drug-delivery device to the
20 extended response, and that's a pharmacologic
21 response, and what are the issues that are key to
22 making this work appropriately. Under
23 "PRODUCT" -- the product, of course, as we saw
24 yesterday, was the drug-delivery device as shown
25 here, the cigarette, and issues that are important

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2387

1 are, of course, the design, all the design variables
2 that can be manipulated in order to ensure that it's
3 delivering the appropriate level of nicotine, that
4 it, the nicotine delivery, remains within this
5 dose-range window, and then combustion, because
6 combustion is a very complex process, and trying to
7 understand better the nature of the combustion
8 reaction in the products therefore would presumably
9 give one a better handle on design issues in terms of

10 manipulating the variables that are important to
11 design. And then when you have the delivery -- and
12 this is, of course, essentially the drug coming out
13 of the portal, and it's in the form of an aerosol, so
14 being able to understand better issues of aerosol
15 dynamics and aerosol chemistry would be something
16 that they would want to do. And they point out it's
17 a dynamic chemistry. We saw yesterday that these --
18 these dynamics are happening on the millisecond time
19 scale, they're -- they're over in a flash of an eye,
20 very, very fast, so that as a result they're
21 difficult to study, things are happening so fast.
22 But it is a dynamic chemistry, and the better one
23 could understand that chemistry, presumably the
24 better off one would be in making appropriate design
25 decisions.

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2388

1 And then finally, what's the response? Well the
2 response that will be elicited, the pharmacologic
3 response, which is, in fact, the -- the intention of
4 this device, will be related to the smoke chemistry,
5 which is very complex. Obviously you pull out -- out
6 of smoke chemistry, which refers to thousands and
7 thousands and thousands of compounds, you pull out
8 the one compound which is key, nicotine, study that,
9 and then the receptors where nicotine binds
10 molecularly to receptors in the human body to elicit
11 its pharmacologic response.

12 So they talk about joint programs, B&W and
13 Hamburg, Southampton, talk about aerosol properties
14 and the subject response, which I've -- which I've
15 covered, and then the smoke chemistry and smoke. And
16 you'll notice pH is pulled out as a specific issue.
17 And then fast smoke chemistry methods, it refers to
18 this dynamic chemistry, trying to come up with means
19 of -- of tracking maybe reactions or product
20 formation on a very rapid time scale to try to
21 understand these -- these processes.

22 So this gives us a nice overview of basically
23 how the industry views its product, its drug-delivery
24 system from design to effect, from design to the
25 recipient, to the receptor, to the pharmacologic

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2389

1 response.
2 Q. And doctor, could you direct your attention,
3 then, to Exhibit 13576, which is a Brown & Williamson
4 document dated September 20th, 1979.
5 Do you -- I'm sorry.
6 A. I have it.
7 Q. Exhibit 13576. Is this one of the documents you
8 reviewed in this case?
9 A. Yes, it is.
10 Q. Does it form part of the basis of your opinion?
11 A. Yes.
12 Q. And does it address issues that were addressed
13 in the documents of other defendants in this case?
14 A. It does.

15 MR. CIRESI: Your Honor, we'd offer Exhibit
16 13576.

17 MR. BERNICK: No objection.

18 THE COURT: Court will receive 13576.

19 BY MR. CIRESI:

20 Q. The title of this document's a little difficult
21 to make out, it's "TAR/NICOTINE RATIOS AND NICOTINE
22 TRANSFER EFFICIENCIES OF B&W AND COMPETITION BRANDS."
23 And there's a stamp that it's a confidential
24 document.

25 Could you direct your attention, doctor, to the
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2390

1 third page of the document which bears Bates number
2 180.

3 A. Yes.

4 Q. And the title is "TAR/NICOTINE RATIOS AND
5 NICOTINE TRANSFER EFFICIENCIES OF B&W AND COMPETITION
6 BRANDS." Is there reported here an analysis by Brown
7 & Williamson with respect to tar/nicotine ratios and
8 nicotine transfer efficiency by manufacturers?

9 A. Yes. This is shown in Table 1 on that page.

10 Q. Toward the bottom?

11 A. Yes.

12 Q. And if you go over to the next page, with regard
13 to those tar/nicotine ratios and nicotine transfer
14 efficiencies, what is reported in the document?

15 A. Well the tar-to-nicotine ratios are ranked in
16 order at the top with Philip Morris having the
17 highest tar-to-nicotine ratio and American having the
18 lowest.

19 Q. So if one were to read that, is Philip Morris
20 greater than B&W, greater than RJR?

21 A. Greater than -- which is approximately the same
22 as L&M, greater than Lorillard, greater than
23 American.

24 Q. And then what's the next statement?

25 A. The next ranking is the nicotine transfer

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2391

1 efficiency, and in that order it's Philip Morris has
2 the highest nicotine transfer efficiency, followed by
3 RJR, with Brown & Williamson and L&M approximately
4 the same, greater than Lorillard, and all of them
5 greater than American, American having the lowest
6 nicotine transfer efficiency.

7 Q. And what is reported, then, in the next
8 paragraph?

9 A. Well they make the point that "Perhaps not
10 coincidentally" -- that is, perhaps this is actually
11 the result of conscious decisions that had been made
12 in formulation of cigarettes -- "Philip Morris and R.
13 J. Reynolds have the highest average nicotine
14 transfer efficiency and they have the highest USA
15 sales." And they say that "The very high nicotine
16 transfer efficiency for Philip Morris brands is
17 consistent with the more alkaline" -- that means the
18 higher pH -- "the higher ammonia content" -- that
19 refers to the higher ammonia content of the material

20 in the tobacco --
21 Q. And in Table 2 is there a reporting of the total
22 alkaloid levels in nicotine deliveries of
23 competitors' brands and B&W's?
24 A. Well in Table 2 is -- is the -- the total
25 alkaloids by percent in the tobacco material, that's
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2392

1 in the cigarette, ranging from about 1.8 to about
2 2.1, a little higher than that percent, so that gives
3 you the spread in terms of percent alkaloids, with
4 nicotine being the primary alkaloid, then, by weight
5 in the tobacco. And then the nicotine delivery
6 that -- that follows in terms of milligrams of
7 nicotine delivered per cigarette, which varies from a
8 low of .75 milligrams per cigarette for L&M to a high
9 of 1.07 milligrams per cigarette for R. J. Reynolds.

10 Q. All right, doctor. Could you turn, please,
11 then, to Exhibit 10874. It should be in volume one.

12 Doctor, we've talked about design parameters of
13 ventilation, filtration, pH, nicotine transfer
14 efficiency. Are there other design parameters to
15 control nicotine transfer?

16 A. Oh yes, there's -- as shown here in the first --

17 Q. Ah, can't refer to the document yet, it's not --
18 I just want to know if there are others.

19 A. Oh, sorry.

20 Yeah, there are others.

21 Q. Okay. Now directing your attention to Exhibit
22 10874, that's one of the documents that you reviewed
23 in this litigation?

24 A. Yes.

25 Q. It's a B.A.T -- excuse me, a B&W document dated
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DIRECT EXAMINATION - DR. CHANNING ROBERTSON

2393

1 April of 1984. And does it form part of the basis of
2 your opinion in this case?

3 A. It does.

4 Q. And does it address issues that were addressed
5 in others of the defendants' documents that you
6 reviewed?

7 A. Yes.

8 MR. CIRESI: Your Honor, we'd offer Exhibit
9 10874.

10 MR. BERNICK: Your Honor, I think this
11 actually is comprised of two documents that are
12 stapled together. They are in sequential Bates
13 number order, but they are, I think, in fact two
14 different documents. One would begin at the Bates
15 number ending four and the next would begin with the
16 Bates number ending nine. We have no objection to --

17 I don't know whether Mr. Ciresi wants to
18 introduce both, but we have no objection, certainly,
19 to the first one.

20 THE COURT: Can we call it A and B?

21 MR. CIRESI: Excuse me, Your Honor?

22 THE COURT: Can we call it A and B?

23 MR. CIRESI: We could. It's one document.

24 That's the way it was produced, Judge. That's the

25 only reason we have it this way. We're only going to
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2394

1 be referring to the first page.

2 THE COURT: Okay. Well if there's no
3 objection that they can use it to cross-examine, why
4 don't we refer to it as 10874A and 10874B.

5 MR. BERNICK: I have no objection to that,
6 Your Honor.

7 THE COURT: All right. Let's do that just
8 so we can keep it together.

9 MR. CIRESI: That's fine, Your Honor.

10 THE COURT: Okay.

11 MR. CIRESI: Then 10874B would commence on
12 the last three Bates numbers 009.

13 MR. BERNICK: Correct.

14 THE COURT: All right. They'll be received
15 then.

16 BY MR. CIRESI:

17 Q. Doctor, what are some of the other design
18 parameters influencing nicotine transfer efficiency?

19 A. Well as we've seen, there's pH. There is also
20 paper permeability of the paper wrap around the
21 tobacco rod. The extent of ventilation. The
22 pressure drops through both the tobacco rod and the
23 filter. Burn rates. And other things would include
24 the total alkaloid content of the cigarette and
25 the -- oh, the moisture content and the filter

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2395

1 efficiency, as an example. So there are many, many
2 variables that go into establishing the nicotine
3 transfer efficiency.

4 Q. Were those other design parameters addressed in
5 the documents of the other defendants?

6 A. Yes.

7 Q. Can you direct your attention, please, doctor,
8 to Exhibit 11973. Is this another of the documents
9 that you reviewed in this case?

10 A. Yes, it is.

11 Q. It's a B.A.T. Company Ltd. document?

12 A. Yes.

13 Q. And does it form part of the basis for your
14 opinion in this case?

15 A. Yes.

16 Q. And does it address issues that were addressed
17 in others of the defendants' documents?

18 A. Yes.

19 MR. CIRESI: Your Honor, we'd offer Exhibit
20 11973.

21 MR. BERNICK: No objection.

22 THE COURT: Court will receive 11973.

23 BY MR. CIRESI:

24 Q. Now does this document, doctor, encompass the
25 physical design properties that you've discussed in

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2396

1 the course of your testimony?
2 A. Yes, it encompasses many of them.
3 Q. And is there also a portion in this document
4 commencing at Bates 755 that deals with cigarette
5 smoke?
6 A. Yes.
7 Q. Does that section deal with an overview of the
8 combustion process that takes place in the cigarette?
9 A. Yes. It provides a summary.
10 Q. Can you direct your attention, please, doctor,
11 to page 755 first. I guess we're on "CIGARETTE
12 SMOKE." And if you could now go to page 760, seven
13 six zero --

14 Actually, doctor, let me -- let me ask you to
15 back up first. Could you go back to page 756, and in
16 the introduction, what is being described in the
17 introduction of this portion of the document?

18 A. Well it begins with a statement that "Cigarette
19 smoke has been described as one of the world's most
20 complicated chemical systems. This is because the
21 smoke is derived from burning a natural substance -
22 the tobacco - containing hundreds of chemical
23 constituents." And then points out that, "On
24 burning, the tobacco is exposed to temperatures
25 ranging from ambient," which would be room

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2397

1 temperature, "to 950 degrees Centigrade in the
2 presence of varying concentrations of oxygen;
3 resulting in thousands of chemical products being
4 formed via several distinct routes. The quantities
5 of the chemical products formed are dependent on the
6 nature of the tobaccos used as well as on a large
7 variety of cigarette parameters like paper
8 permeability which affect the combustion process."

9 So this goes to reemphasize the massive
10 complexity that is present in the burning cigarette
11 and how difficult it is to get your arms around truly
12 all that is going on piece by piece, and in fact it's
13 probably not possible.

14 Q. Can you direct your attention, then, to page
15 760, and I'd like to specifically direct your
16 attention to this section that's called "GENERATION
17 OF SMOKE," to the middle of the page which
18 addresses -- addresses the states in which chemicals
19 exist in smoke. And you can --

20 Would you please describe what's being reported
21 there.

22 A. Well they point out that "Thus, smoke," as we
23 talked about yesterday, "consists of a large number
24 of very small particles of liquid in a mixture of gas
25 and vapor." Now they point out "The distinction

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2398

1 between gas and vapor is a -- is a fine one," and
2 I -- I just might add that generally that distinction
3 is the gases are non-condensable, like oxygen and
4 argon and carbon dioxide and carbon monoxide, and the
5 vapors are generally those that are -- are

6 condensable that can exchange back and forth between
7 the particle and the gas or vapor phase. So "The
8 distinction between gas and vapor is a fine one and
9 for most practical purposes it is best to assume that
10 a smoke aerosol has only two phases" - the
11 "particulate phase," the -- the drops, "and
12 gas/vapor." So "Broadly speaking, therefore, we have
13 three states in which chemicals can exist in smoke."
14 There are those that are wholly in the -- in the
15 liquid droplets, and these would be the -- the
16 non-volatile components of what we refer to as -- as
17 tar, it's the -- it's the non-volatile components of
18 the combustion process. They're generally
19 high-molecular-weight materials, condensation,
20 polymers that form in the combustion process that
21 just simply don't evaporate or distill, then there
22 are those that are wholly in the -- in the gas,
23 things like -- well I'll say things like oxygen and
24 CO and CO₂, although those can partition into the --
25 into the particle phase somewhat, and then those in

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2399

1 both phases. And what's really being referred to
2 there are the distillable compounds such as nicotine,
3 as we saw can exist in the particle phase in both the
4 unbound and the bound forms, the free base form and
5 in the ionized form, or it can exist in the vapor
6 phase, but only in the free base form as we saw
7 yesterday.

8 Q. Doctor, could you then direct your attention to
9 page 763, which deals with smoke measurement, and at
10 the top of the page we see a depiction, and can you
11 tell us what's being represented there?

12 A. Well it's headed "SMOKE -- SMOKE MEASUREMENT,"
13 and what's shown in the cartoon is something called a
14 Cambridge filter. And on the left it shows a
15 depiction of smoke or the smoke aerosol, which would
16 be the little liquid droplets suspended in the
17 gas/vapor, and what they're trying to show is that if
18 this aerosol is passed through this Cambridge filter,
19 all the particles, all the little droplets remain
20 behind on the filter and just the vapor and gas pass
21 through.

22 The Cambridge filter is a glass fiber filter
23 that has a very, very high retention capacity for
24 particles in the size range of smoke, and it's used
25 in analytical testing methods to determine the amount

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2400

1 of particulate matter in smoke. And in fact in the
2 FTC, the Food and -- Federal Trade Commission test,
3 it's used to establish the level of tar that
4 ultimately is -- is used in the advertising of
5 cigarettes where it's required to be -- required to
6 be reported.

7 So the idea is that you pass the smoke through
8 this filter, the particles adhere to it, you then
9 take the filter and you process it. So that you can
10 do -- in the FTC method you do three things, you

11 determine how much water is in it, you determine how
12 much nicotine is in it, and what's left you call tar.
13 So when you see tar and nicotine reported in an
14 advertisement or on a cigarette carton or on a
15 billboard, it comes from this type of a -- a
16 measurement.

17 The vapor or gas is generally collected in a --
18 in a bag, and anything that is in that gas phase can
19 also be measured, if you -- if you like. One of the
20 things that is typically measured is the carbon
21 monoxide levels in -- in certain testing methods.

22 And if you turn to the top of the next page --
23 Q. Doctor, before you go there, let -- let me ask
24 one thing. At the bottom of the cartoon it says one
25 thousand million particles. What's being referred to

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2401

1 there?

2 A. Well it's -- it's a -- an estimate of the number
3 of particles per cc that are present in cigarette
4 smoke that are -- that is drawn through a cigarette
5 and into the oral cavity. So one thousand million
6 particles is one billion particles, and a cubic
7 centimeter is about -- maybe three-eighths of an inch
8 on a side, something like that, if you want to get a
9 picture of what a cubic centimeter looks like. It's
10 pretty small. So in that there would be, according
11 to this estimate, about one -- one billion of these
12 particles.

13 Typically when you inhale smoke you might take
14 in anywhere from -- you can take in as much as you
15 possibly can, I suppose, but, you know, typical
16 levels might be 35 to 50, 60 cc's, so you would be
17 approaching ten billion particles in a -- in a puff.
18 And those ten billion particles, then, are what the
19 body has to deal with both in the mouth and in the
20 upper respiratory system during the inhalation when
21 it's taken into the lungs.

22 Q. And there's a reference there to particle size,
23 .1 to 1.0 microns. I believe earlier in your
24 testimony you stated that eight to ten microns would
25 be one-tenth of the diameter of a human hair; is that

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2402

1 correct?

2 A. Eight to ten microns?

3 Q. Yes.

4 A. Yeah, roughly. These particle sizes, .1 to one
5 microns, there's -- of course in -- in this aerosol
6 there's a range of particle sizes. Typical cigarette
7 smoke will have a particle size which is generally
8 characterized to be nominally in the -- somewhere in
9 the .2 to .3 micron range, and of course there's a
10 few particles that are larger and there -- there are
11 some that are smaller. They're not all the same
12 size.

13 Perhaps another way of saying it is that the --
14 the red cells that carry the oxygen and the carbon
15 dioxide in our blood are about eight microns across,

16 and so these -- these particles are actually much,
17 much smaller than even a red blood cell is, by a
18 factor of 50 or so. So they're very, very small.
19 And then each of them, as it says, can contain many,
20 many chemical substances. And this number of ten
21 thousand substances is -- is reported at times, some
22 numbers less, some numbers much higher. I don't
23 think anyone actually knows how many chemicals are in
24 smoke particles.

25 Q. Doctor, you were about, then, to move over to
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2403

1 the next page on the FTC measurement.

2 A. Well I just wanted to point out that one has to
3 be a little circumspect when you're reporting tar
4 numbers because sometimes people will report all the
5 material that comes off of the Cambridge filter,
6 sometimes all that material but without the nicotine,
7 and sometimes all that material without the nicotine
8 and without the water. And usually most of the time
9 the smoke figures were reported as PMWNF, which is
10 Particle Matter, Water and Nicotine Free, which means
11 the material that was on the filter minus the water
12 and minus the nicotine.

13 Q. And doctor, could you then direct your attention
14 to page 765, which is entitled "To put the
15 composition of smoke into context." Can you explain
16 what is being reported therein?

17 A. Well there's a graph that shows the whole smoke
18 composition, and this is on a -- on a weight basis.
19 So if you were to take smoke and weigh the various
20 constituents in smoke, this pie chart tells you the
21 various contributors to the weight that you measure.

22 You can see that the bulk of the weight is
23 nitrogen and oxygen, which of course are the two
24 primary molecular constituents of air. And then
25 you'll see, starting in the right-hand side of the

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2404

1 pie, hydrogen, argon and methane. Argon is a natural
2 constituent in air. And then you have hydrogen and
3 methane, which would be products of the combustion
4 reactions. Then you have CO, which is carbon
5 monoxide, which would be also a product of the
6 combustion reaction, but an incomplete combustion.
7 If it had been complete, you would have carbon
8 dioxide. And then four and a half percent of total
9 particulate matter, so this would refer to the tar
10 material. So about five percent of smoke by weight,
11 roughly, is the tar material.

12 I'm at the age where my eyes are not allowing me
13 to read this small print, but I think it looks like
14 ten percent -- does that say "REST?" I suppose if no
15 one can read it, it's not relevant.

16 Q. I think it says "REST."

17 A. I think it's just what's left over, and that's
18 one percent. And then it looks like one percent
19 water. And then about 13 and a half percent vapor
20 phase compounds, of which it looks like there's a --

21 a number in there for CO₂, which I can't quite make
22 out. But some of the vapor phase compounds will be
23 CO₂, which is another product of combustion. And it
24 will be also those compounds which pass through the
25 Cambridge filter that happen to be in the gas or

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2405

1 vapor phase at the time the smoke went through the
2 filter. This is what's generally collected in the
3 bag along with the nitrogen and the oxygen and the
4 nitrogen, argon and methane. So this just gives you
5 an idea of the relative amounts by weight of the
6 various constituents that one finds in smoke.

7 But we have to remember that in that little bit
8 of the pie that says "TPM," there's tens of thousands
9 of chemicals lurking there. This is just how much
10 they weigh, it's not what they are or what they do.

11 Q. Doctor, can you then direct your attention to
12 the next page, and I'd like to specifically direct
13 your attention to the top where it says "The most
14 common smoking regime is." Can you tell us what that
15 is?

16 A. Well there was a -- a time, I believe, in the
17 late -- if my memory serves me -- in the late 1960s,
18 where the -- the industry was required to report tar
19 and nicotine in their products. Now there was a time
20 prior to that, as I understand, where they reported
21 tar and nicotine. It was in a -- in a -- in a period
22 which I think has been referred to as the -- the Tar
23 Derby where people were reporting and the companies
24 were reporting values, but without a great deal of
25 consistency. No one was quite sure how these values

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2406

1 were reported, what they were measured on, and if
2 they were truly fair comparisons of one company's
3 brands compared to another. Followed by another
4 period when there was no reporting, and then back to
5 this period in the late '60s where the Federal Trade
6 Commission developed a -- a test for measuring tar
7 and nicotine. It's called the FTC method. And this
8 involves collecting the particles on the Cambridge
9 filter and measuring the amount of nicotine and water
10 and then, by weight, subtracting out the rest of the
11 material that's collected and calling that tar.

12 So in order to make this measurement they use a
13 machine, a smoking machine which -- into which
14 cigarettes can be placed, and then these cigarettes
15 are smoked by the machine. And the smoke is passed
16 through the Cambridge filter, which is analyzed when
17 the smoking machine is finished under the smoking
18 regimen that's been established. And that has been
19 used for -- for many, many, many years.

20 The volume of smoke taken on each puff is 35
21 cc's, and the machine puffs for two seconds, so it
22 collects 35 cc's over a period of two seconds, and
23 then when 58 seconds have passed so that the total
24 time now adds up to a minute, it takes another puff
25 again of 35 cc's over two seconds, and it puffs the

2407

1 cigarette -- it smokes the cigarette until the
2 cigarette reaches a predetermined length. And I
3 believe on a non-filtered cigarette it's 23
4 millimeters remaining and then the machine stops; and
5 on filter cigarettes I believe it's the filter or the
6 overwrap, the tipping paper plus three millimeters,
7 it's smoked down to that level.

8 Now as I understand it, at least in some
9 instances, the way they do that is they -- they tie a
10 little thread around the cigarette, and when the fire
11 comes -- reaches this little thread and -- and the
12 thread either burns or breaks or whatever it does,
13 that trips a microswitch and it stops the machine
14 from smoking that cigarette any -- any further. So
15 the idea is to try to smoke these cigarettes in a --
16 in a rather uniform manner across the board to try to
17 take out variations in such things as puff frequency
18 and puff duration and puff volume.

19 And so the FTC would make these measurements.
20 They're -- they're made frequently. There's a --
21 there's a sampling collection where cigarettes are
22 purchased -- collected from around the country,
23 certain number, and then those are taken to a testing
24 laboratory. And a certain number of those that are
25 purchased are removed from the carton and a certain

2408

1 number from a pack, there's a -- there's a protocol
2 that's followed, until finally you -- you -- you feel
3 you have a good random sample of the particular
4 cigarette brand, and then those are -- those are
5 smoked. And the numbers that are reported on the
6 packages for the tar and nicotine are the result of
7 this kind of -- of testing. And as I understand it,
8 several hundred cigarettes are -- are smoked in order
9 to get appropriate statistics to report these
10 numbers.

11 Q. Doctor, can you direct your attention, then, to
12 page 768, and is there reported therein comments
13 regarding nicotine delivery?

14 A. Yes. There's a section entitled "NICOTINE
15 DELIVERY," Section 4.2.

16 Q. And what's reported therein, sir?

17 A. Well again, as we've discussed, nicotine is an
18 alkaline substance. When it's added to water it
19 causes the pH to rise. And it exists in two
20 forms -- we've seen that now -- the bound or the salt
21 form, and the free form. However, only in the free
22 form is it relatively volatile.

23 In tobacco it is present mainly in a salt form;
24 that is, in the tobacco material itself. So when a
25 cigarette is smoked, nicotine is released momentarily

2409

1 in the free form so that it can enter the vapor

2 phase, and in this form nicotine is more readily
3 absorbed through the body tissue, as we saw
4 yesterday. Hence, it is the free nicotine which is
5 associated with impact; that is, the higher the free
6 nicotine, the higher the impact.

7 Q. And doctor, if you go to page 769, is there
8 reported therein the effect of sugars as they burn in
9 the combustion process?

10 A. I think I've said before when the sugars burn,
11 they tend to give rise to acidic materials, to acids,
12 and of course an acid will tend to cause the pH to --
13 to drop. And so this table of percent sugar in the
14 leaf ranging from zero to 20 percent is correlated
15 against smoke pH, and you can see as the percent of
16 sugar in the leaf rises, the smoke pH drops. And
17 this is why the various kinds of tobaccos that go
18 into the -- the blend help to establish what the pH
19 of smoke ultimately will be, because we saw yesterday
20 that the burley tobaccos tend to be more alkaline or
21 tend to move the smoke to a higher pH, and the
22 flue-cured tobaccos, the Virginia or the bright, tend
23 to move the pH of the smoke in the opposite
24 direction.

25 Q. And doctor, finally, can you direct your
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2410

1 attention to page 771, which is entitled "5.2 PRODUCT
2 VARIABILITY." Is there set forth therein and on the
3 succeeding pages the various factors that you've
4 discussed which affect product variability?

5 A. Yes. A number of those factors are -- are
6 broken out, starting with tobacco grades, which we've
7 talked about.

8 Q. Is blending efficiency another one?

9 A. And then on the next page the blending
10 efficiency. The paper permeability, paper in which
11 the cigarette is wrapped. The cigarette weight.
12 This is a -- a -- basically a quality control/
13 quality assurance type of parameter. And the filter
14 pressure drop, which has to do with the amount of
15 effort it takes to puff. If you have a very high
16 pressure drop, it makes it more difficult to puff; if
17 you have a lower pressure drop, it's -- it's easier.
18 And then ventilation, which we talked about. So
19 those are certainly some of the variables that we've
20 been discussing over the last few days.

21 Q. Now doctor, based on your investigation in this
22 case, your education, experience and expertise, your
23 review of all the defendants' documents, do you have
24 an opinion to a reasonable degree of scientific
25 certainty whether the defendants recognized the need

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2411

1 for establishing a nicotine dose range to be
2 delivered to the human body?

3 A. Yes, I do.

4 Q. And did they do so, sir?

5 A. They did.

6 Q. And based upon your education, experience,

7 expertise, and your review of the defendants'
8 documents and investigation in this case, do you have
9 an opinion to a reasonable degree of scientific
10 certainty whether the defendants controlled, through
11 design parameters, the nicotine dose range delivered
12 to the human body?

13 A. They did.

14 Q. And doctor, based on your education, your
15 experience, your expertise, and based upon your
16 review of the defendants' documents and your
17 investigation in this case, do you have an opinion to
18 a reasonable degree of scientific certainty whether
19 the defendants controlled nicotine by the various
20 design parameters in order to ensure the
21 pharmacological efficacy of the cigarette as an
22 engineered drug-delivery device?

23 A. They did so.

24 MR. CIRESI: Thank you, doctor. I have no
25 further questions.

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2412

1 THE COURT: We'll take a short recess.

2 THE CLERK: Court stands in recess.

3 (Recess taken.)

4 THE CLERK: All rise. Court is again in
5 session.

6 (Jury enters the courtroom.)

7 THE CLERK: Please be seated.

8 MR. BERNICK: Thank you, Your Honor. Good
9 morning.

10 (Collective "Good morning.")

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CROSS-EXAMINATION - DR. CHANNING ROBERTSON

2413

1 CROSS-EXAMINATION

2 BY MR. BERNICK:

3 Q. Good morning, Dr. Robertson. I think you know
4 from a little conversation we had before you took the
5 stand, my name is David Bernick and I represent Brown
6 & Williamson and a couple of related companies, and
7 I'll be asking you the questions this morning,
8 probably -- at least a little bit into this
9 afternoon.

10 I want to begin with your background and just
11 trace a little bit of the sequence of how you became

12 involved in this case and what you've done since.
13 And I want to maybe draw a line here for January of
14 '97 and ask you whether, as I understand it this is
15 true, that you became involved in this litigation in
16 December of 1996; is that correct?

17 A. Yes.

18 Q. Okay. If we go prior to 12-96, it's true, is it
19 not, that none of the many publications that appear
20 as attachments to your CV --

21 I think you mentioned that there were over 130
22 of them; is that right?

23 A. Approximately.

24 Q. Okay. Is it true that none of those
25 publications are publications about tobacco?

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CROSS-EXAMINATION - DR. CHANNING ROBERTSON

2414

1 A. That's correct.

2 Q. Is it true that prior to December of nineteen
3 seventy -- 1996, when you first became involved in
4 this case, that you had not attended any seminars
5 about tobacco research? Is that true?

6 A. No seminars explicitly dedicated just to tobacco
7 research, no.

8 Q. Okay. Is it true that prior to December of 1996
9 you had never held yourself out to your peers as
10 being an expert in the field of tobacco research?

11 A. No, I hadn't done that.

12 Q. Is it true that prior to December of 1996 you
13 had never been retained to act as an expert regarding
14 tobacco research?

15 A. I had not.

16 Q. Is it true that the reason that you were
17 contacted by counsel for the state to act as a
18 witness in this case is not that you were known as an
19 expert in tobacco research, but that you were known
20 to Mr. Ciresi by reason of your prior work for him in
21 prior litigation?

22 A. Well I can't speak to the reason that Mr. Ciresi
23 inquired as to whether or not I would get engaged in
24 this work. He called me up and we had a
25 conversation, and he came and visited me and we

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2415

1 discussed it. And he knew my background as a
2 chemical engineer, a person involved in design, might
3 be of some assistance. So I agreed to at least take
4 a look to see what was available and to see whether
5 or not I could provide some assistance to him in
6 trying to understand some of the issues related to
7 cigarette design and nicotine delivery.

8 Q. But the reason that Mr. Ciresi knew about you in
9 particular is not because you had published in the
10 field of tobacco research, but because you had a
11 prior relationship with him in prior litigation;
12 isn't that true?

13 MR. CIRESI: Objection, asked and answered.

14 THE COURT: It's been asked and answered.

15 BY MR. BERNICK:

16 Q. Since December of 1996, as I understand it,

17 you've done an expert report for this case?
18 A. That's correct.
19 Q. And I think that that was -- we'll put 1/98.
20 I think that was in June of '97 that you issued
21 your report; correct?
22 A. I submitted a report at the end of -- at the end
23 of May, yes.
24 Q. And that report summarized the opinions that you
25 expected to offer in this litigation; correct?

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2416

1 A. Based upon the documents I had reviewed at that
2 point, yes.
3 Q. And you gave a deposition, I think it was in
4 August of '97?
5 A. That's right.
6 Q. And again you had the opportunity, based upon
7 what you had reviewed, to offer up the opinions that
8 you were expected to testify to in this case;
9 correct?
10 A. Yes. At that time, that's correct.
11 Q. Now we've already gone through what it is that
12 was your state of knowledge about tobacco research
13 prior to December of '96. I'd like to cover a little
14 bit what materials and sources of information you
15 reviewed after December of '96 in order to be able to
16 offer the opinions that you offered in your report
17 and your deposition.

18 It's true, is it not, that you did a cursory
19 review of literature relating to tobacco during this
20 period of time?

21 A. Up until the time of the deposition, I had
22 begun -- I had begun a literature review which was
23 incomplete at the time. I had spent the great
24 majority of my time looking at the internal documents
25 of the defendants that had been provided to me in

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2417

1 order to understand how it was they went about their
2 business and what business in fact they were engaged
3 in. I had a wealth of information available to me
4 which I drew on that point.

5 Q. Dr. Robertson, my question was directed to your
6 review of the scientific literature. We're going to
7 talk about the documents in a moment.

8 And I'll put the question to you again. Is it
9 true that prior to the time that you gave your
10 deposition in this case, that the only literature
11 review that you did was, in your own words, a cursory
12 literature search?

13 MR. CIRESI: Objection, asked and answered.

14 THE COURT: You may answer that.

15 A. Well as I -- as I indicated, I had begun a
16 literature -- literature review. It wasn't
17 necessarily complete at the time, and -- and at the
18 time of the deposition I didn't have a clear view of
19 how much more I would review or -- or need to review
20 in order to confirm the opinions I had reached at the
21 time of the deposition based on my review of the

22 internal documents, coupled with my background as
23 a -- some almost 30 years as a chemical engineer
24 dealing with issues that were very similar to what I
25 was seeing in the -- in the documents regarding the
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2418

1 design issues.

2 MR. BERNICK: Your Honor, I move to strike
3 as not responsive. I'm asking the witness for his
4 own characterization of the scope of the literature
5 review that he actually did.

6 THE COURT: I believe the witness has
7 responded.

8 BY MR. BERNICK:

9 Q. Have you used the word yourself, Dr. Robertson,
10 "cursory," to describe the literature search that you
11 did?

12 MR. CIRESI: I'm going to object to the
13 form of the question. It's still repetitious.

14 THE COURT: No, you may --

15 MR. CIRESI: The same --

16 THE COURT: You may answer that.

17 A. That was a word I used in the deposition, yes.

18 Q. Incidentally, prior to December of '96, before
19 you were retained, isn't it true that you had done no
20 testing in your laboratory on cigarettes?

21 A. That's correct.

22 Q. Isn't it true that you had done no testing in
23 your laboratory on the components of cigarettes?

24 A. That's true.

25 Q. Is it also true that you had not even reviewed

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2419

1 the work of any other scientist relating to the
2 testing of cigarettes or cigarette components prior
3 to December of '96?

4 A. Well the work I was engaged in prior to that
5 time, either in my lab or in my consulting
6 relationships, were not related to the tobacco
7 industry or to issues of cigarette smoking. But as I
8 said -- as I said earlier, the reason that I became
9 involved in this case was because of the background
10 and expertise that I have in the area of design with
11 regard to issues that involve chemical engineering
12 and bioengineering and biotechnology, which are all
13 very closely related to the issues at hand here.

14 Q. Dr. Robertson, if you could turn to page 11 of
15 your deposition -- which should be over at your
16 left-hand side there. Did you understand --

17 You've given a deposition before; have you not,
18 Dr. Robertson?

19 A. Excuse me?

20 Q. You've given depositions before; have you not?

21 A. Yes.

22 Q. Before this litigation?

23 A. Yes, I have.

24 Q. And I think you must have given depositions in
25 connection with the other work that you did for Mr.

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2420

1 Ciresi; correct?

2 A. The other work that you're referring to in which
3 I gave a deposition was about ten years ago. That's
4 the only time I ever gave a deposition in any work
5 with Mr. Ciresi.

6 Q. But I take it the answer to my question is yes,
7 you gave a deposition in that litigation, too?

8 MR. CIRESI: Objection, it's asked and
9 answered, Your Honor.

10 THE COURT: Sustained.

11 Q. You know, in this particular case, when you gave
12 your deposition, you were under oath and you had an
13 obligation to tell the truth; did you not?

14 A. True.

15 Q. Okay. And were you asked this question and did
16 you give this answer at line eleven:

17 "Question: Had you reviewed the work of any
18 other scientist relating to testing of cigarettes or
19 cigarette components prior to December of 1996?"

20 And your answer was: "I don't believe so."

21 Was that question asked of you and was that your
22 response at that time under oath?

23 MR. CIRESI: Excuse me, doctor. Your
24 Honor, it's an inappropriate use of a deposition.
25 He's already answered it.

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2421

1 THE COURT: Sustained.

2 BY MR. BERNICK:

3 Q. After December of 1996, we talked about the
4 literature review that you did; correct?

5 A. Well I had begun a review, yes, by that time.

6 Q. Isn't it true that by the time that you were
7 deposed you were not aware of any seminars on tobacco
8 and cigarette design that had been held in the United
9 States on a periodic basis?

10 A. Well that may have been the case. I -- by that
11 time, the time of the deposition, I had not turned up
12 a great deal of material external to the information
13 that I had been reviewing in your clients' documents
14 that had resulted in the expert report.

15 MR. BERNICK: Your Honor, I move to strike
16 that as non-responsive. I asked a simple question
17 about his awareness of seminars.

18 THE COURT: I think it's responsive enough,
19 counsel.

20 Q. Isn't it true that at that time you were also
21 unaware of any professional societies, could not name
22 them, any professional societies with respect to
23 tobacco science?

24 A. Well that may have been the case, since my -- if
25 I had -- if I had run into any of them in the

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2422

1 internal documents, I certainly -- I guess I hadn't
2 recalled them at the time that the deposition was

3 given.
4 Q. Isn't it true that by the time your deposition
5 was given in this case, you could not even name any
6 of the experts who existed in the field of cigarette
7 design?
8 A. I don't remember that precisely. But again, I
9 had not searched the external literature with regard
10 to whom those people might be. Again, my attention
11 was focused on the documents of the clients, and to
12 the extent that names would have appeared in those
13 documents, most likely I wouldn't have retained them
14 since I wasn't looking to memorize people's names and
15 the roles that they had played.
16 Q. Would you turn to page 461 of your deposition.
17 Do you see at line 20 the questions that are asked
18 there and the answers that you gave?
19 A. At line 20?
20 Q. At line 20 of page 461, carrying on to 462, line
21 five.
22 Does that refresh your recollection that you
23 were unable to name any of the outside external
24 experts that were established in the field of
25 cigarette design?

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2423

1 MR. CIRESI: Your Honor, it's again an
2 improper use of a deposition.
3 THE COURT: Sustained.
4 Q. Do you have any independent recollection, Dr.
5 Robertson, of being able to name any -- anybody at
6 your deposition in the field of cigarette design?
7 MR. CIRESI: Objection, asked and answered.
8 THE COURT: Sustained.
9 Q. Dr. Robertson, as I took a look at your expert
10 report that you issued in this case, am I correct
11 that it's comprised almost exclusively of references
12 to internal company documents?
13 A. I think that would be a fair characterization
14 because that is where I had spent all my time.
15 Q. Okay. Would it be fair to say that there is
16 absolutely no discussion in your report of what the
17 outside scientific literature has to say about
18 cigarette design?
19 A. My focus at that time was on the internal
20 documents, what the internal documents taught me
21 about the activities taking place throughout the
22 cigarette industry over many, many, many years, and
23 it is on the basis of that information that I
24 constructed the report because that's the basis from
25 which my opinions flow, not -- not from people

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2424

1 outside the industry who didn't have a clue of what
2 you people were doing, but from inside where I could
3 get the real answers to the questions I was asking
4 with regard to what was going on with nicotine,
5 nicotine control and nicotine delivery and nicotine
6 manipulation. That's what I was doing.
7 Q. And in order to reach that opinion, you didn't

8 review, as a scientist, and comprehensively, the
9 outside scientific literature; is that fair?
10 MR. CIRESI: Objection, repetitious, asked
11 and answered.
12 THE COURT: It is repetitious, counsel.
13 BY MR. BERNICK:
14 Q. In order to reach that opinion that you just
15 offered, you made no comparison between what you read
16 in the documents and what existed in the scientific
17 literature; correct, Dr. Robertson?
18 MR. CIRESI: Objection, it's repetitious
19 and it's irrelevant.
20 THE COURT: You may answer that.
21 A. As I said, I was focused on the internal
22 documents and what they told me about the activities
23 that were taking place behind the walls of the
24 cigarette companies --
25 Q. Dr. Robertson --

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2425

1 A. -- and --
2 May I finish my answer, please?
3 Q. I'm sorry. Sure.
4 A. So I studied those documents to come to the
5 opinions that I came to, and these opinions are based
6 upon the activities in these companies of which no
7 one on the outside had any direct information. And I
8 wouldn't have expected to find the kind of
9 information I found inside those documents on the
10 outside; after all, they're all marked "SECRET" and
11 "CONFIDENTIAL."
12 MR. BERNICK: Your Honor, I move to strike
13 as being non-responsive and as lacking foundation.
14 THE COURT: The answer will stand.
15 BY MR. BERNICK:
16 Q. Dr. Robertson, if we go ahead and take a look at
17 your expert report, isn't it true that between the
18 time that you issued your report in June of 1997
19 until today, that you've never issued any amendment,
20 supplementation, or change to your expert report? Is
21 that a fact?
22 A. No, it's not a fact.
23 Q. Have you issued another document that sets forth
24 your opinions in this case other than the report that
25 you issued in June of '97?

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2426

1 A. There was a supplemental -- as I understand it,
2 a supplemental offering as to additional documents
3 that I had reviewed.
4 Q. Sure. Okay. And I'll rephrase my question,
5 because that's fair, Dr. Robertson.
6 I'm asking you whether you ever issued another
7 document that set forth your opinions since you
8 issued your report in June of 1997. Did you ever do
9 that?
10 A. No. There was no need because as I continued to
11 obtain documents -- I understand it that not all the
12 documents had been produced by the time I had written

13 my report, and they were still coming in, and so I
14 would look at them, and the reason I looked at them
15 was to be sure that the opinions that I had reached
16 in May would still stand. Obviously, if I found
17 information that might cause me to change my opinions
18 or to amend them, I would have done so. But all I
19 found in the streaming -- in the streams of new
20 documents that came my way was just further
21 confirmation of what these people were doing in their
22 laboratories, in their research and development
23 activities to control and manipulate and deliver
24 nicotine.

25 MR. BERNICK: Your Honor, I move to strike
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2427

1 as non-responsive. I asked him a very simple
2 question, which was whether he ever issued another
3 report.

4 MR. CIRESI: Oppose the motion.

5 THE COURT: The answer will stand.

6 BY MR. BERNICK:

7 Q. As a result of anything that you reviewed, Dr.
8 Robertson, did you see fit -- did you come to the
9 conclusion that anything that you had said in this
10 document was in need of being changed?

11 MR. CIRESI: Objection, Your Honor, it's
12 been asked and answered.

13 THE COURT: No. You may answer that.

14 THE WITNESS: I'm sorry, did you --

15 THE COURT: You may answer.

16 A. Could I have that back?

17 Q. Yes.

18 As a result of anything that you reviewed, did
19 you come to the conclusion that any of the statements
20 that you made in your report were in need of being
21 changed or supplemented?

22 A. No, I hadn't reached that conclusion.

23 Q. Okay. I'd like to go through a question to you
24 that's a general one, and then get into some more
25 specifics.

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2428

1 You have a background, Dr. Robertson, as I
2 understand it from your testimony, in working for a
3 research institution; correct?

4 A. I don't know what you're talking about.

5 Q. Is Stanford University a research institution?

6 A. No.

7 Q. Oh. You don't do research there?

8 A. It's a university.

9 Q. And a university is not a research institution.

10 A. A university encompasses research and education
11 and teaching. It's not a research institution.

12 Q. Okay. So I take it that when you're at that
13 institution, in fact you go ahead and do research
14 from time to time.

15 A. I'm just objecting to your characterization of
16 the university.

17 Q. Whatever, Dr. Robertson. I'll just put another

18 question to you so we don't --
19 Is it a fact that while you're at Stanford you
20 do a lot of research?
21 A. Part of my activities is, in fact, operating
22 a -- a laboratory with students who are getting
23 advanced degrees, doing research. And I also teach
24 these students at the graduate level and at the
25 undergraduate level. So there is an educational

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2429

1 component to what I do in addition to the research
2 component.
3 Q. Fine. And is it true that when scientists do
4 research, they often develop theories, and then in
5 the course of their research they have try to find
6 out if those theories are true or false? Isn't that
7 something that people do in research do?

8 A. Generally research begins with a hypothesis.

9 Q. That's the right term to use there, a
10 hypothesis?

11 A. I use that term, a hypothesis.

12 Q. Okay. That's fine.

13 And the hypothesis -- you tell me if I'm
14 wrong -- is an idea or a proposed principle the
15 scientist says maybe this is true, and part of the
16 research is to find out whether the hypothesis is
17 correct. Would that be fair?

18 A. Generally, yes, develop a means whereby you can
19 test the hypothesis to establish whether or not it
20 has merit.

21 Q. Okay. Would it be then fair to say that not all
22 hypotheses are proven? Would that be a fair thing to
23 say, Dr. Robertson?

24 A. Sure, I think that's a fair thing to say.

25 Q. Okay. And is it also true that to get from the

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2430

1 research, even when the research is -- the hypothesis
2 is proven, to a product, that can require an awful
3 lot more work, correct, to apply the research?

4 A. So now you're talking about a --

5 You're not talking about the kind of research
6 that I'm doing, then, at Stanford, because we're not
7 in the product-development business.

8 Q. I understand.

9 A. We do research to advance the state of
10 knowledge.

11 Q. Okay. And do other people become involved in
12 the research --

13 As you're familiar with it, do other people
14 become in research -- involved in research with the
15 idea of developing or changing a product? Is that
16 another kind of research that you can do?

17 A. It can be described in that way. That's --

18 You know, we use the term or we used a term
19 "research and development." Typically --

20 Q. R&D?

21 I'm sorry, go ahead.

22 MR. CIRESI: May the witness finish his

23 answer?

24 MR. BERNICK: Sure.

25 A. I mean typically the way it's -- it's commonly
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2431

1 used when you say "research" is that you are seeking
2 answers to very fundamental questions. The answers
3 that you -- that you get may or may not have
4 immediate applicability, and generally those that
5 appear to are handed off to development or product
6 development where they are -- they are embraced, in a
7 way, and put into the form -- a form that offers
8 utility.

9 Q. Okay. Now I think you've -- you've explained a
10 couple things that are important. At Stanford
11 University you're more involved in what I think you
12 called fundamental or basic research?

13 A. Generally at Stanford I'm involved in basic --
14 what I would call basic research, yes.

15 Q. Okay. And whereas people who work for companies
16 often become involved in doing research that's
17 product oriented; correct?

18 A. Well I think it's fair to say that research
19 that's done within -- within an organization would be
20 in some way directed to the goals and mission of that
21 organization. But it can still, nonetheless, be
22 very, very fundamental. I mean good examples are
23 companies like the -- the Bell Labs, which were in
24 the communications business but stumbled across the
25 transistor and things like that because of

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2432

1 fundamental research that they were doing. So you --
2 you're never quite sure what's going to come out.

3 Q. You're never quite sure what's going to work and
4 what's not going to work; correct?

5 A. Well in terms of research, you're never quite
6 sure what the answer is going to mean in terms of
7 product utility. And I'm sure that when Shockley
8 invented the transistor at Bell Labs, he had no idea
9 that it would evolve into Microsoft and Intel and all
10 these other -- the computer generation that we're in
11 now, so sometimes you just don't -- you don't know
12 where it will take you.

13 Q. So when a company gets involved in doing
14 research and development that's oriented towards
15 their product, there, too, is going to be hypotheses
16 and theories that don't ultimately end up being true
17 or usable; correct?

18 A. Well there's a difference. They could be true
19 and not usable. They could be --

20 Q. Hard to -- hard to be usable without being true.

21 A. Well you said it, I didn't.

22 Q. Okay. But -- but certainly the company doing
23 R&D work, it often is the case it will -- it will
24 happen that people develop ideas that don't turn out
25 to have real value or usability in a product; would

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1 that be fair?
2 A. That's fair. It may be later that it has
3 utility. It may never have utility.
4 Q. May never have.
5 A. It might have utility somewhere else.
6 Q. Okay. Let's focus all of our attention in the
7 first instance this morning on what actually happened
8 to cigarettes as a product. So all the questions I'm
9 going to be asking you are what actually happened to
10 the cigarettes as a product. Are you with me?
11 A. Well we'll see.
12 Q. Well, we will.
13 You described, I believe it was yesterday, Dr.
14 Robertson -- I don't know if this has got an exhibit
15 number, I know it has been shown to the jury -- the
16 cigarette cross section. Do you recall that?
17 A. Sure.
18 Q. Okay. And you went through -- I think you
19 talked about this particular chart and said that
20 these were the key elements of the cigarette. Do you
21 recall that?
22 A. Oh, I may have used that term. Honestly, I
23 don't recall that.
24 Q. Okay. Isn't it true that in 1979, the Surgeon
25 General of the United States in his report went
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1 through each of these key elements and described or
2 determined how each of these elements had the effect
3 of reducing delivered tar to the smoker?
4 A. Well I'm not immediately familiar with what
5 you're referring to in the Surgeon General's report,
6 whether that was done or not.
7 Q. Okay. Could you take a look at the report.
8 It's right before you. It's that -- it's that --
9 it's the thickest of the Surgeon General's reports.
10 It's in evidence as JG -- J -- GJ113.
11 A. The big fat one?
12 Q. The big fat one. And if you'll direct your
13 attention to page 14-114 --
14 You let me know when you've got the right page.
15 A. Okay. I have it.
16 Q. And do you see where the top of it says
17 "REDUCTION OF BIOLOGICAL ACTIVITY OF CIGARETTE
18 SMOKE?" The '79 Surgeon General's report.
19 A. Okay.
20 Q. Do you see where it says that at the top?
21 A. Uh-huh. Yes.
22 Q. And do you see that as you go down the left-hand
23 side, you have a bunch of methods, and they range
24 from agricultural aspects of cigarettes to tobacco
25 processing to cigarette production and tobacco
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1 substitutes. Do you see that?
2 A. Yes.
3 Q. And do you also see that under the column marked

4 "TAR," the Surgeon General in '79 indicates with a
5 plus which of the different methods have the effect
6 of reducing tars, all the way down to cigarette
7 production? Do you see that?

8 MR. CIRESI: Your Honor, I'm going to
9 object to this as being outside the scope of this
10 expert's opinions. He didn't address tar in the
11 sense of carcinogenic or anything else in that
12 regard.

13 THE COURT: Well are you able to answer
14 this question, doctor?

15 THE WITNESS: I'm not sure what the
16 question was he asked me.

17 THE COURT: Okay. All right, let's
18 rephrase the question, then, and we'll see what
19 happens.

20 BY MR. BERNICK:

21 Q. Isn't it a fact that what this table shows is
22 that when it comes to each of the key
23 elements -- let's begin with cellulose acetate
24 filters. Did you describe to the jury that one of
25 the key elements was the filter plug?

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2436

1 Dr. Robertson. Did you describe to the jury
2 that one of the key elements of the cigarette was the
3 filter plug?

4 MR. CIRESI: Excuse me. Your Honor, the
5 witness was reading the document and then he
6 interrupted him with the question.

7 THE COURT: Maybe you should give him a
8 chance to read the document.

9 MR. BERNICK: Sure.

10 A. Okay, I -- I see where it says cellulose acetate
11 filters, and there's a plus in the tar column.

12 Q. Okay.

13 A. And I can read the footnote which says plus
14 is -- refers to significant, whatever that means.

15 Q. All right. The plug, the filter plug is a
16 cellulose acetate filter; correct?

17 A. It is in this table.

18 Q. Right. And you described and you showed the
19 video of the factory about how all those filters came
20 out of the machine. Remember that?

21 A. Yeah. I saw that, yes.

22 Q. And what the Surgeon General is saying in that
23 table, is he not, is that the cellulose acetate
24 filter has the effect of reducing tar delivery;
25 correct?

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2437

1 MR. CIRESI: Objection, Your Honor, it's
2 outside the scope of this expert's report.

3 MR. BERNICK: Your Honor, he talked
4 extensively about tar and nicotine, particulates and
5 the filter.

6 MR. CIRESI: He talked about the design
7 parameters which affected delivery of nicotine. That
8 was what he's proffered for.

9 THE COURT: Doctor, are you able to answer
10 the question?
11 A. I can only parrot back what the table says.
12 Q. Isn't what the table says --
13 Let me put it to you this way, Dr. Robertson:
14 Isn't it a fact that the cellulose acetate filter has
15 the effect of reducing the measured delivery of tar?
16 Isn't that the effect of the cellulose acetate
17 filter?
18 A. That's an effect.
19 Q. An effect. Fine.
20 If we go to the cigarette wrapper, isn't one of
21 the effects of the cigarette wrapper to
22 reduce -- through porosity, it can reduce the
23 delivered levels of tar; isn't that also true?
24 A. According to this table there's a plus in -- in
25 that column.

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2438
1 Q. Okay. Based upon your own understanding, isn't
2 it true that paper porosity, if you increase the
3 porosity of paper, one of the effects of that is to
4 lower the delivery of tar as measured through the FTC
5 method?
6 A. It's a -- basically a form of ventilation.
7 Q. And the answer, therefore, is it will have the
8 effect of reducing FTC measurements of tar; true?
9 A. All other things remaining equal, that's what --
10 that's what one would expect.
11 Q. Okay. And when it comes to the ventilation
12 holes, again is one of the effects of the ventilation
13 holes to reduce the FTC-measured tar delivery?
14 A. Well I don't see --
15 Perforated filters, this is what they're
16 referring to.
17 Q. Based upon your own knowledge, is one of the
18 effects of ventilation of the holes to reduce the
19 FTC-measured deliveries of tar?
20 A. Yes, I've seen that.
21 Q. Okay. If we go inside of the tobacco column to
22 the tobacco rod itself, isn't it true that if you use
23 expanded tobacco, that expanded tobacco on the table,
24 isn't it true that if you use expanded tobacco, one
25 of the effects of using expanded tobacco is to reduce

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2439
1 the FTC-measured deliveries of tar?
2 A. Well expanded tobacco allows you to put less --
3 essentially less tobacco material in the rod, and so
4 you have less to combust.
5 Q. And therefore you have lower tar deliveries as
6 measured through the FTC method; correct?
7 A. That's an expectation, yes.
8 Q. Okay. If you talk about reconstituted
9 tobacco -- you gave a presentation yesterday on
10 reconstituted tobacco -- isn't it true that one of
11 the effects of using reconstituted tobacco is to
12 lower the FTC measurements of tar?
13 A. I think there are data that would -- that would

14 support that. Certainly it says so in this table.
15 Q. Okay. Extraction, you also talked about
16 extraction in the course of your remarks yesterday,
17 and we saw in the videotapes the extraction process.
18 Isn't it true that one of the effects of extraction
19 is to reduce the FTC-measured deliveries of tar?
20 A. Well I don't believe that's what they're talking
21 about in this table. This was organic solvent
22 extractions, which appear in the remarks to be only
23 of academic interest.
24 Q. I just asked you a question about the videotape
25 that you showed yesterday. Isn't one of the effects

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2440

1 of the extraction process to reduce the FTC-measured
2 deliveries of tar? Or do you know?
3 A. Well in the paper recon process where you remove
4 the water solubles and -- and -- and add them back to
5 form that material, I think I've seen -- seen data
6 that would -- would indicate that to be the case,
7 yes.
8 Q. Okay. Now if we go ahead and take a look at the
9 impact of some of these different changes --
10 Do you have the 1989 Surgeon General's report
11 there? You have '81. Alternatively, you can look at
12 volume one -- volume one, tab five, in those --
13 I'll just make it easier for you. I know those
14 notebooks are heavy.

(Document handed to the witness.)

16 Q. I'm going to hand you what's been marked as
17 Exhibit BYN58. It's the 1989 Surgeon General's
18 report.

19 MR. CIRESI: Pardon me, counsel? May I
20 have it again?

21 MR. BERNICK: Oh, I'm sorry. Yes. BYN58.

22 MR. CIRESI: This is the '89 Surgeon
23 General's report?

24 MR. BERNICK: Correct.

25 MR. CIRESI: You didn't designate that. Do
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2441

1 you have the title?

2 MR. BERNICK: Twenty-five years of --

3 Do you have an extra full copy for him? I think
4 it may be up on his table as well.

5 Q. Are you with me? Do you have the '89 report in
6 front of you?

7 A. Yes.

8 MR. BERNICK: Your Honor, we would offer
9 the '89 Surgeon General's report into evidence.

10 MR. CIRESI: We have no objection, but it's
11 not on their list, so we're --

12 I presume you're going to place it up on the
13 overhead?

14 MR. BERNICK: Sure.

15 THE COURT: All right. That's BYN58?

16 MR. BERNICK: Yes.

17 THE COURT: I just want to make sure
18 that --

19 MR. BERNICK: I'm sorry. Yes, it's BYN58.
20 THE COURT: I want to make sure other
21 counsel has a copy.
22 MR. CIRESI: They've given us one now, Your
23 Honor.
24 THE COURT: You have a copy. All right.
25 Court will receive, then, BYN58.

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2442

1 BY MR. BERNICK:
2 Q. If you turn to page -- it's off the bottom of my
3 copy here -- page 88, do you see up in the upper
4 left-hand corner a chart that talks about tar and
5 nicotine contents of cigarettes on a sales-weighted
6 average basis?
7 A. Yes, I see the chart.
8 Q. Okay. And I've got also a poster here so that
9 we can make easier reference to it later on.
10 MR. BERNICK: Mike, do you want to --
11 MR. CIRESI: I assume it's the same,
12 counsel.
13 MR. BERNICK: It certainly is.

14 BY MR. BERNICK:
15 Q. Do we see, Dr. Robertson, that what this chart
16 describes is the tar content and nicotine content of
17 cigarettes, sales-weighted average basis, from 1957
18 to 1987, and the top line would be the tar and the
19 bottom line would be the nicotine? Is that what we
20 see in that chart?
21 A. Yes.
22 Q. And do we see that also on the chart there is
23 indicated the changes that have been made to
24 cigarette design over the years, indeed the same
25 changes that we now just talked about, and the effect

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2443

1 of those changes on FTC-measured deliveries. Is that
2 what this chart reflects?
3 A. Well it shows some of the changes that were
4 made.
5 Q. Well the ones in particular that we just talked
6 about, I think, are all on there; am I right? Recon,
7 porous paper, expanded tobacco and ventilation.
8 A. Yes.
9 Q. And is what that chart shows is that, again
10 according to the FTC's method, that the effect of
11 making these changes over the years has been to lower
12 the measured delivery of tar from cigarettes?
13 A. Yes. The measured delivery as determined by
14 FTC.
15 Q. Okay. Now part of what I'd like to ask you
16 relates to the very end of the chart over to the
17 right-hand side. Do you see where tar is kind of
18 at -- a little bit over -- you have to actually put
19 your eye over here. This -- this side deals with the
20 scale of tar deliveries; right?
21 A. That's correct.
22 Q. Okay. So that by the end of this chart in '87,
23 the sales-weighted average of tar deliveries was

24 something like, you know, maybe 12 to 14 milligrams;
25 would that be correct?

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2444

1 A. Approximately.

2 Q. Okay. In point of fact, today -- this is a
3 sales-weighted average, but today you can go into the
4 store and buy different brands of cigarettes with FTC
5 tar deliveries that go all the way down to about one
6 milligram; right?

7 A. There are products on the market that have one
8 milligram tar as measured by the FTC.

9 Q. And by the same token, for people who want
10 higher deliveries, there are also higher deliveries
11 that go on up to, what, 18 milligrams of tar per FTC?

12 A. Approximately, yes.

13 Q. Okay. Now this change in the measured
14 deliveries of cigarettes, isn't it true that the
15 Surgeon General recognized explicitly that this
16 change in deliveries had the effect of reducing the
17 biological activity of smoke?

18 MR. CIRESI: Objection, Your Honor, this is
19 outside the scope of his testimony.

20 MR. BERNICK: Your Honor -- Your Honor, the
21 witness testified specifically to carcinogens in
22 smoke, and this relates to the biological activity of
23 smoke. That's why I'm asking him.

24 THE COURT: Okay. But I'm not sure he's
25 qualified to make that decision as to what the

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2445

1 Surgeon General's basis is.

2 MR. BERNICK: Oh. Well okay.

3 THE COURT: I think you can -- maybe you
4 can rephrase it.

5 MR. BERNICK: I'll try to lay some
6 foundation.

7 BY MR. BERNICK:

8 Q. Have you looked into the question, Dr.
9 Robertson, of what the Surgeon General has said about
10 the effects of reducing these smoke deliveries on the
11 level of biological or carcinogenic activity? Have
12 you looked into that?

13 MR. CIRESI: You may answer that.

14 A. Well I haven't explicitly looked into that.
15 That wasn't what I was doing in this case. I was
16 looking at the physical and chemical aspects of
17 cigarette design as it pertained to nicotine
18 delivery.

19 Q. Well I notice that in your report you make
20 reference to the -- one of the -- one of the things
21 that you list as additional materials reviewed by
22 Channing Robertson is the 1981 Surgeon General's
23 report. Is that one of the particular Surgeon
24 General reports that you did in fact review in
25 connection with your work on this case?

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1 A. Well I did look at the Surgeon General's reports
2 that I was provided with, but as you know, they're
3 very voluminous.

4 Q. Okay.

5 A. And my focus, as I've said, was on the internal
6 documents of the companies and their activities over
7 this period of -- of time for which we had -- for
8 which we had documents with regard to what they were
9 doing in connection with reductions in tar and
10 nicotine over the years.

11 Q. Did you look and see what the Surgeon General
12 said about the effect of those design changes on the
13 risks that smokers face when they smoke a cigarette?
14 Did you do that?

15 MR. CIRESI: Objection, Your Honor, it's
16 outside the scope of direct. It also is an improper
17 question in form with respect to time. Which --
18 which Surgeon General, et cetera.

19 MR. BERNICK: I'm talking about --

20 THE COURT: It is too vague. But you
21 may --

22 MR. BERNICK: I can rephrase it.

23 THE COURT: Just a moment.

24 MR. BERNICK: Okay.

25 THE COURT: You may answer the question if

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1 you're able to, doctor.

2 THE WITNESS: No, I'd rather have it --

3 MR. BERNICK: I'm sorry, what?

4 THE WITNESS: Could you have it -- give it
5 back to me again, please?

6 MR. BERNICK: Sure.

7 BY MR. BERNICK:

8 Q. When you read that Surgeon General's report in
9 1981, did you check to see whether the design
10 features that you were focused on and the design
11 changes that you've described, did you check to see
12 what the Surgeon General said about the effect that
13 they would have on health risk?

14 MR. CIRESI: Your Honor, I'm going to
15 object to that as calling for information outside the
16 scope of this expert's testimony. We have experts on
17 health risks.

18 THE COURT: Okay. You may answer it if
19 you're able to, doctor.

20 A. I did not examine that explicitly, no. As I
21 said, I was looking at the internal documents as they
22 spoke to me with regard to the activities within the
23 various companies over the years as modifications
24 such as these occurred, and what it was they were
25 thinking and what it was they were doing with regard

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1 to tar and nicotine deliveries over the -- over the
2 years. And quite frankly, in those documents there
3 was little, if any, discussion of health effects.

4 MR. BERNICK: Your Honor, I move to strike

5 the last statement as non-responsive.
6 THE COURT: Well the answer will stand.
7 BY MR. BERNICK:
8 Q. Well you showed the jury just a few moments ago
9 this morning Exhibit 11973, which is a BATCo
10 document, and I've got the same chart up on the
11 screen that you showed the jury at that time.
12 When you were showing the jury this pie chart of
13 the constituents of smoke, are you saying that you
14 were not -- you have no opinion and you're making no
15 commentary that any of those components are harmful
16 to human health?
17 MR. CIRESI: Your Honor, are we going to
18 qualify the witness and get into the health effects?
19 It's outside the scope of this witness's testimony.
20 THE COURT: Okay.
21 MR. CIRESI: It's an improper question.
22 THE COURT: Sustained.
23 BY MR. BERNICK:
24 Q. When you were showing the jury all these
25 additives -- remember this chart here -- just tell me
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2449
1 one way or another: Were you suggesting that these
2 additives had some -- any one of these additives had
3 some particular health risk to the smoker?
4 MR. CIRESI: Objection, outside the scope.
5 THE COURT: Sustained.
6 Counsel, don't direct the witness how to answer,
7 please.
8 MR. BERNICK: Okay. I'm -- I'll rephrase
9 my question.
10 BY MR. BERNICK:
11 Q. Do you or do you not know, Dr. Robertson,
12 whether any of these additives pose any particular
13 health risks for smokers?
14 MR. CIRESI: Objection, outside the scope
15 of this witness's testimony.
16 THE COURT: Sustained.
17 BY MR. BERNICK:
18 Q. It's true, is it not, Dr. Robertson, that the
19 changes that we've talked about here and that you
20 discussed in talking about the key elements, is it
21 true that those changes were encouraged by scientists
22 working at the National Cancer Institute?
23 MR. CIRESI: Objection, Your Honor, outside
24 the scope of this witness's testimony.
25 THE COURT: You may answer if you know.
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2450
1 A. Well I am familiar, although I don't know the
2 details, that there was a concern expressed by health
3 authorities in the -- I think in the mid '50s, late
4 '50s, regarding certain adverse effects related to
5 smoking and to health.
6 Q. Okay. And in particular in the 1970s, are you
7 familiar with the pronouncements of scientists from
8 the National Cancer Institute on encouraging the
9 industry to in fact lower the deliveries of tar? Do

10 you know about that one way or another?
11 MR. CIRESI: Objection to the form of the
12 question. Counsel's testifying.
13 THE COURT: Sustained.
14 Q. Are you familiar with what the Cancer --
15 National Cancer Institute said in the 1970s about
16 reducing deliveries?
17 THE COURT: That's better.
18 (Laughter.)
19 THE COURT: Go ahead.
20 A. Is there a question, or is that my answer?
21 Q. We'll see.
22 THE COURT: I just told counsel that he
23 asked an acceptable question at this point.
24 A. I'm aware that there were issues raised by
25 public health authorities over a concern of the
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2451
1 adverse effects of smoking toward public health.
2 Q. I want to show you what's already in evidence as
3 GI27, and I'm just going to ask you a very simple
4 question about it, which is whether you are familiar
5 with the -- with the prescription for low-risk
6 cigarettes that was issued by scientists for the
7 National Cancer Institute?
8 MR. CIRESI: Objection to the form of the
9 question, Your Honor, with regard to this document.
10 MR. BERNICK: That's what the title is.
11 THE COURT: You can answer the question.
12 Q. Are you familiar with this prescription, Dr.
13 Robertson?
14 A. I haven't seen this document, no.
15 Q. Are you familiar with the Banbury report that
16 was issued in 1980 on a conference concerning safer
17 cigarettes?
18 A. I have heard of it, yes.
19 Q. It's volume one, tab 16, Exhibit JG107.
20 MR. CIRESI: GJ?
21 MR. BERNICK: I'm sorry, GJ. Yes.
22 May I approach the witness, Your Honor?
23 THE COURT: Yes.
24 (Document handed to the witness.)
25 MR. BERNICK: Here's the whole report.
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2452
1 BY MR. BERNICK:
2 Q. Do you see that that's a copy of the report that
3 issued on the Banbury conference, conference in 1980
4 on a less hazardous -- on less hazardous cigarettes?
5 A. Well it's entitled "A SAFE CIGARETTE." Yes, as
6 I said, I've heard of it, but I haven't read this
7 before.
8 Q. You've never taken a look at this?
9 A. Not in detail, no.
10 Q. Okay. Are you familiar that at the Banbury
11 conference scientists, both for the tobacco industry
12 and outside scientists, met to discuss changes that
13 could be made to cigarettes with a view to making
14 them safer? Was that your understanding of the

15 purpose of the conference?
16 MR. CIRESI: Your Honor, I'm going to
17 object to the use of documents which relate to
18 matters outside the scope of the expert testimony of
19 this witness.

20 THE COURT: Okay.

21 MR. BERNICK: I'll clarify my question,
22 Your Honor. That's not my intent in asking the
23 question, so I'll rephrase it. I understand the
24 witness has not reviewed this document in detail, so
25 my question was not related to this particular

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2453

1 document.

2 MR. CIRESI: Well --

3 Q. Dr. Robertson, I'd like to ask you --

4 MR. CIRESI: Excuse me, counsel. My
5 objection goes to attempting to deal with subject
6 matters outside the scope of the witness who's on the
7 stand.

8 THE COURT: Let me hear the question first,
9 counsel.

10 BY MR. BERNICK:

11 Q. Are you familiar, Dr. Robertson, with the fact
12 that the Banbury conference was a meeting of both
13 tobacco company scientists and outside scientists in
14 the field of public health concerning what changes
15 could be made to cigarettes in order to make them
16 safer? Was that your understanding of the purpose of
17 the conference?

18 A. Well I don't -- I don't really have an
19 understanding, but I can see that there were people
20 that were from academic organizations and the
21 national laboratories. They -- they give a list of
22 the participants.

23 Q. Do you have any understanding, Dr. Robertson, of
24 the recommendations that came out of that conference
25 for changing the design of cigarettes, separate and

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2454

1 apart from the documents that are before you? As I
2 understand it, you haven't had an opportunity to
3 review it.

4 Separate and apart from that document, do you
5 have any understanding of the recommendations that
6 came out of that conference for changing the design
7 of cigarettes?

8 A. Well it's -- it's tough to have that if I
9 haven't examined the document.

10 Q. Well I -- that -- it's tough to have a
11 specific --

12 I'm just trying to probe what it is you know.
13 You said you heard of the conference. All I'm
14 asking --

15 THE COURT: Counsel, counsel, --

16 MR. BERNICK: Okay.

17 THE COURT: -- please.

18 Q. Do you have any understanding from whatever
19 source, the document or elsewhere, about the

20 recommendations that came out of that conference?
21 MR. CIRESI: Objection, asked and answered.
22 THE COURT: Well I'll allow you to answer
23 that.
24 A. Well as I said, I haven't -- I haven't even read
25 the conclusions, so it's hard for me to tell you what
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2455

1 the recommendations were.
2 Q. In fact isn't it true -- not specifically
3 focused on the Banbury conference, but isn't it true
4 that the changes that were made to cigarettes along
5 the lines reflected in this chart and in the '89
6 Surgeon General's report, that those changes were
7 applauded by members of the public health community
8 because of their effect in reducing the risk of
9 cigarettes?
10 MR. CIRESI: Your Honor, I'm going to
11 object to these form of questions where the
12 witness -- where the counsel is attempting to testify
13 and use subject matters different than the witness
14 who is on the stand has testified to.
15 THE COURT: The objection is sustained.
16 And it's well taken, counsel. Try to avoid that,
17 please.
18 BY MR. BERNICK:
19 Q. Dr. Robertson, if we go ahead and take a look at
20 the people who are expert in the field of cigarette
21 design; that is, people who have published in that
22 field, isn't it true that people who have published
23 in the field of cigarette design for the last 20
24 years have very closely linked cigarette design with
25 health effects?

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2456

1 MR. CIRESI: Objection to the form of the
2 question and the subject matter, Your Honor.
3 MR. BERNICK: Well this is a --
4 THE COURT: You may -- just a moment,
5 please.
6 MR. BERNICK: Okay.
7 THE COURT: You may answer the question.
8 A. What -- what experts are you referring to?
9 Q. Dr. Hoffmann. Do you know who Dr. Hoffmann is?
10 A. Sure, I've heard of -- heard of him, yeah.
11 Q. Isn't it true that people like Dr. Hoffmann,
12 people who are experts in cigarette design, when they
13 write about cigarette design, one of their principal
14 focuses is trying to change the design of cigarettes
15 so that they're safer? Isn't that what they write
16 about?
17 A. Well if you show me an article he's written we
18 could -- we discuss it. I don't know that he -- I
19 don't personally know that he's an expert in -- in
20 what we call cigarette design. I don't know if he
21 claims that he's an expert in cigarette design or
22 tobacco research or whatever. I don't -- I don't
23 know the man. And I don't know what documents you're
24 referring to where he's written about cigarette

25 design. So if you want to show me some, we can -- we
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2457

1 can talk about what he did and what he said.

2 Q. Well let me ask you the same question as was
3 asked in your deposition. Update it to today.

4 Can you, as you sit here today, name a single
5 recognized authority, not aligned with the tobacco
6 industry, a single recognized authority in the field
7 of cigarette design? Give me one.

8 A. Well as I said, I've certainly run across Dr.
9 Hoffmann's name. I don't know if he characterizes
10 himself as a cigarette designer, because it seems to
11 me that the cigarette designers are working for the
12 companies and they're designing the cigarettes. I
13 don't know that Dr. Hoffmann has ever designed a
14 cigarette.

15 Q. Okay.

16 A. And I don't know that he has even a clue of the
17 understanding at any given time that your people did
18 with regard to cigarette design and the factors that
19 are important to it.

20 Q. Okay.

21 A. He's on the outside.

22 Q. Sure.

23 A. You kept everything on the industry inside. It
24 was all secret.

25 MR. BERNICK: Your Honor, I move --
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2458

1 A. So talking to people --

2 MR. BERNICK: -- to strike the editorial
3 comment.

4 MR. CIRESI: Well, Your Honor, he's asked
5 this witness about subject matters outside the scope
6 of the direct examination here, and that's the tactic
7 that he uses, and he -- then he asks an open-ended
8 question and he gets the answer.

9 THE COURT: Counsel, counsel, --

10 MR. CIRESI: I object to --

11 THE COURT: -- do you have a legal
12 objection?

13 MR. CIRESI: Yes. I object to counsel's
14 characterization of the defendants -- or the
15 witness's answer.

16 THE COURT: The objection is sustained.

17 BY MR. BERNICK:

18 Q. Dr. Robertson, independent experts in the field
19 of cigarette design, can you tell us one person today
20 who holds himself out as being an expert in the field
21 of cigarette design?

22 MR. CIRESI: Objection, asked and answered.

23 THE COURT: That's been asked and answered
24 now, counsel.

25 MR. BERNICK: Your Honor, this would be a
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2459

1 good time to take a break. I've got a new subject
2 matter coming up.
3 THE COURT: All right. Why don't we recess
4 for lunch. We'll reconvene at 1:40.
5 THE CLERK: Court stands in recess.
6 (Recess taken.)
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2460

1 AFTERNOON SESSION.
2 THE CLERK: All rise. Court is again in
3 session.
4 (Jury enters the courtroom.)
5 THE CLERK: Please be seated.
6 MR. BERNICK: Good afternoon.
7 (Collective "Good afternoon.")
8 BY MR. BERNICK:
9 Q. Good afternoon, Dr. Robertson. I want to go
10 back to the chart that we'd been working with today
11 out of the Surgeon General's report and ask you
12 whether it's true that by 1970 or thereabouts, after
13 the tar deliveries had begun to and indeed had
14 already been declining, whether about this point in
15 time it became published in the scientific literature
16 that people might be compensating in smoking lower
17 delivery cigarettes? Did that occur at about that
18 time?
19 I'll put a little mark around 1970. Was that
20 about the date that that occurred?
21 A. I'm unaware of the date that that became public.
22 Q. Okay. Are you aware that in the 1981 Surgeon
23 General's report, which was on the list of reports
24 that you had reviewed, are you aware of the fact that
25 in 1981 the Surgeon General's report expressed

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2461

1 concern over the possibility that people were
2 compensating when they smoked lower delivery
3 cigarettes?
4 A. It may have. I don't recall that.
5 Q. Well if you'd turn to Exhibit TG237, which is

6 the '81 Surgeon General's report -- I think that
7 that's the -- I think you've got a copy. It's the
8 thin right next to the stack there. There you go.
9 Do you see, if you take a look at the preface of
10 this report, it recites that "As early as 1966, the
11 Public Health Service" --
12 The Surgeon General's part of the Public Health
13 Service; correct?
14 Dr. Robertson?
15 A. I was trying to find the place.
16 Q. I'm sorry. The Surgeon General's part of the
17 Public Health Service; is he not?
18 A. Yes, that's my understanding.
19 Q. Do you see where it says, "As early as 1966, the
20 Public Health Service held that, quote, the
21 preponderance of scientific evidence strongly
22 suggests that the lower the tar and nicotine content,
23 the less harmful would be the effect." Do you see
24 that statement there?
25 A. Yes.

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2462

1 MR. CIRESI: Your Honor, I'm going to
2 object to this line of questioning. Again it's
3 outside the scope of direct of this expert.
4 THE COURT: The objection is sustained.
5 BY MR. BERNICK:
6 Q. Well then to go a little bit further down on
7 this page where the Public Health Service says
8 that -- in this 1981 report, that is, the Surgeon
9 General's report -- "The Public Health Service has
10 reviewed the question again in far greater depth than
11 before. Overall, our judgment is unchanged from that
12 of 1966 -- 1966 and 1979. Smokers who are unwilling
13 or as yet unable to quit are well advised to switch
14 to cigarettes yielding less tar and nicotine,
15 provided they do not increase their smoking or change
16 their smoking in other ways."
17 MR. CIRESI: Your Honor --
18 MR. BERNICK: Excuse me.
19 MR. CIRESI: Excuse me, counsel. I'm again
20 going to object to the scope of this examination.
21 This is the subject matter of another expert's
22 testimony.
23 MR. BERNICK: Your Honor, if he'd just
24 allow me to finish asking the question, he'll see
25 that I'm laying a foundation for a further statement

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2463

1 in this report that it relates to. I want to read
2 the statement completely.
3 THE COURT: Why don't you ask your
4 question.
5 MR. BERNICK: I'm sorry?
6 THE COURT: Why don't you ask your
7 question.
8 MR. BERNICK: Okay.
9 BY MR. BERNICK:
10 Q. The carryover sentence is, "But our new review

11 raises new questions and suggests an even more
12 cautious approach to the issue. Here are the basic
13 findings of the report," and there's a colon, and it
14 says, "Smokers may increase the number of cigarettes
15 they smoke and inhale more deeply when they switch to
16 lower yield cigarettes. Compensatory behavior may
17 negate any change of the lower yield product or even
18 increase the health risk."

19 Does that, then, provide the Surgeon General's
20 statement that the Public Health Service is concerned
21 with the issue of compensatory behavior?

22 MR. CIRESI: Once again, Your Honor, we'd
23 object to the scope of this inquiry. It's outside
24 the scope of this expert's testimony.

25 MR. BERNICK: Your Honor, he --

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2464

1 MR. CIRESI: He testified -- excuse me,
2 counsel. He testified on design of the cigarette
3 with respect to a nicotine-delivery device, not on
4 the health effects of smoking.

5 THE COURT: Sustained.

6 BY MR. BERNICK:

7 Q. Dr. Robertson, is it a fact that the Surgeon
8 General was focused on compensatory smoking behavior
9 in connection with lower yield cigarettes at this
10 time?

11 MR. CIRESI: Same objection, Your Honor.

12 MR. BERNICK: Your Honor, there was
13 extensive testimony through this witness about our
14 documents concerning compensation for nicotine.

15 MR. CIRESI: There was --

16 THE COURT: Just a moment, please.

17 MR. BERNICK: Excuse me. And what we will
18 establish is that the statements contained in the
19 documents that this witness says were unknown to
20 nobody else were taken right out of similar
21 statements in the pronouncements of the public health
22 authorities. This is the first one.

23 MR. CIRESI: Your Honor --

24 THE COURT: I don't believe that he's
25 testified with respect to any expertise other than

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2465

1 what his review of the documents provided to him.

2 MR. BERNICK: But I believe he has --

3 I understand that, Your Honor, but I believe he
4 has testified extensively that this was all a secret,
5 that nobody else knew about it based on the
6 documents, and what we're seeking to establish is
7 that that ain't so. And I will show the language
8 directly taken from these pronouncements.

9 THE COURT: Okay. I don't know if this is
10 the right witness to ask those questions of.

11 MR. CIRESI: Your Honor, if I may --

12 MR. BERNICK: Well if --

13 THE COURT: The objection -- the objection
14 is sustained.

15 BY MR. BERNICK:

16 Q. I want you to take a look for a moment at
17 TX13668, which you showed the jury in your direct
18 examination, and I want to direct your attention to
19 page ten of that document, which I have up on the
20 screen.

21 A. How do I find the complete document?

22 Q. That would be at volume two, tab 52.

23 Do you see the statement that I've bracketed?

24 MR. CIRESI: May we have a page number?

25 MR. BERNICK: It's page ten.

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2466

1 Q. Quote -- this is from a BATCo document. Quote,
2 "More realistic advice to smokers would be to choose
3 a brand with a lower tar to nicotine ratio which
4 gives them the satisfaction that they require in the
5 lowest amount of smoke taken in." Do you see that?

6 A. Yes, I see where you're reading.

7 Q. And you pointed out that and similar language in
8 many other documents in order to show that the
9 industry was focused on tar-and-nicotine ratios in
10 order to give the smoker the satisfaction that they
11 require in the lowest amount of smoke taken in.

12 MR. CIRESI: Object to that as a
13 misstatement of the evidence.

14 THE COURT: Well the jury will have to rely
15 on their recollection of the testimony.

16 A. And I -- I don't understand your question.

17 Q. All I'm saying is that haven't you shown the
18 jury many other documents that basically make the
19 same kind of statement; that is, the industry was
20 focused on developing tar-to-nicotine ratios in their
21 research which gave the smoker satisfaction that they
22 required in the lowest amount of smoke taken in?
23 Haven't you done that during the course of your
24 testimony?

25 A. Well what the industry was concerned with in the
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2467

1 face of lowering tar is the problem that they would
2 face if the nicotine levels dropped below the
3 pharmacologic threshold, and this is why they were
4 concerned about the tar-to-nicotine ratio, because,
5 as we've said before, if the nicotine delivery fell
6 below that which would give the desired pharmacologic
7 effect, it would be out of business. That's why
8 you're interested in it. You didn't want to go out
9 of business.

10 MR. BERNICK: Your Honor, move to strike as
11 not responsive. I didn't ask what the industry's
12 motives were. I asked whether he read from documents
13 that contained similar language.

14 THE COURT: I believe the answer was
15 responsive, counsel.

16 BY MR. BERNICK:

17 Q. Could you focus on the language of the document
18 for a moment, Dr. Robertson. Let me ask you a very
19 specific question about it.

20 Can you tell us whether that language is any

21 different from exactly what appeared in the Surgeon
22 General's report of 1981?
23 MR. CIRESI: Objection, characterization of
24 another document. It's improper form.
25 THE COURT: Rephrase the question.
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2468

1 MR. BERNICK: Yes.
2 BY MR. BERNICK:
3 Q. Can the --
4 Can you tell us, Dr. Robertson, whether the
5 statement I have bracketed is any different from the
6 precise statement about nicotine ratios that appears
7 in the 1981 Surgeon General's report?
8 MR. CIRESI: Your Honor, then it's
9 irrelevant as to the scope of this witness and his
10 expertise.
11 THE COURT: You can answer if you're able
12 to.
13 A. No, I can't answer that. I don't even remember
14 what it was.
15 Q. I want you to take a look at page 25 of the 1981
16 Surgeon General's report. At the top of the page.
17 Do you see where it says, from the Surgeon General,
18 "Research could show if there is an optimum
19 combination of standard yield and ratio that leads to
20 maximum satisfaction and minimum -- minimal exposure
21 to toxic products. Cigarettes that vary
22 systematically in tar and nicotine ratios are needed
23 for this research." Do you see that statement?
24 A. Yes, I see the statement.
25 Q. And isn't it a fact --

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2469

1 Would you agree with the testimony that Dr. Hurt
2 has offered here that this constitutes a proposal to
3 manipulate nicotine levels?
4 MR. CIRESI: Your Honor, objection to the
5 form, asking one witness to characterize the
6 testimony of another witness.
7 THE COURT: That's an objectionable
8 question, counsel.
9 MR. BERNICK: I'm sorry?
10 THE COURT: That's an objectionable
11 question. You cannot ask him to compare the
12 testimony of another witness.
13 MR. BERNICK: Okay.
14 BY MR. BERNICK:
15 Q. Would you, Dr. Robertson, consider the research
16 being proposed here by the Surgeon General to be
17 research into the manipulation of nicotine levels?
18 A. Well he's talking about cigarettes that vary
19 systematically in tar-to-nicotine ratios are needed
20 for this research, so I see that as a -- an objective
21 statement asking for such items.
22 Q. Would that be the manipulation of nicotine?
23 A. Well if nicotine changes, if it goes up or it --
24 it goes down, as it -- as it has here, that's a form
25 of manipulation.

2470

1 Q. Okay. Now I want to ask you, Dr. Robertson,
2 whether in fact the industry found out, in taking a
3 look at manipulation of ratios as described here,
4 whether the industry found out that -- well let me
5 just do it this way.

6 You also showed the jury this document, Trial
7 Exhibit 13671, about the Y1 product. Do you remember
8 that?

9 A. Yes.

10 Q. And do you remember that you described that
11 document as a document in which the industry was
12 looking to the possibility of developing a
13 genetically engineered tobacco? Do you remember
14 that?

15 A. Yes.

16 Q. And again, the concept was lower tar but perhaps
17 increased nicotine. That would be, again, a
18 different way of achieving a nicotine-to-tar ratio
19 that was different; correct?

20 A. Yes.

21 Q. Okay. And isn't it a fact --

22 Let me show you what is in evidence as J --
23 excuse me, GJ113, which is -- if you take the
24 large --

25 Does he have the big '79 report? Do you have

2471

1 the -- the big one, the '79 report? I thought we put
2 it up there.

3 Where is the '79 report?

4 MR. CIRESI: What's the number, counsel?
5 That's not in evidence.

6 MR. BERNICK: The number is J -- GJ113.

7 MR. CIRESI: What's --

8 MR. BERNICK: It's the '79 report.

9 MR. CIRESI: '79?

10 MR. BERNICK: Do you have it? Okay.

11 BY MR. BERNICK:

12 Q. If you'd take a look at page 14-30, do you see
13 where the Surgeon General describes in 1979 that
14 "Possible approaches that plant scientists can take
15 to modify tobacco leaf have been reviewed by," I
16 think it's "Dr. Tso." Do you know who Dr. Tso was?

17 A. No.

18 Q. Do you know what the Department of Agriculture
19 was developing by the way of new breeds and strains
20 of tobacco during this period of time?

21 A. No, I don't.

22 Q. Do you see where it says, "The main objective of
23 such research is to acquire the desired
24 characteristics which will meet with the acceptance
25 of smokers and at the same time produce a less

2472

1 harmful tobacco?"

2 MR. CIRESI: Your Honor, again we're going
3 into a subject matter that has already been testified
4 to by Dr. Hurt, and it's outside the scope of this
5 witness's testimony, whether it's safer or more
6 harmful with regard to the type of tobacco. It's
7 outside the scope of this expert's testimony.

8 MR. BERNICK: I'm laying a foundation for a
9 further question, Your Honor, and I'll get to it in
10 just a moment.

11 THE COURT: The objection is sustained,
12 unless you have a different question than you've
13 asked.

14 MR. BERNICK: Okay.

15 BY MR. BERNICK:

16 Q. Let's go back to the Y1 product. Do you know
17 why the Y1 strain of tobacco was developed?

18 A. No, I don't know its -- its history.

19 Q. Do you know whether or not the U.S. Department
20 of Agriculture had any role in the development of
21 that strain?

22 A. No. I told you, I don't have any knowledge of
23 its history.

24 MR. CIRESI: Your Honor, I just -- I'm not
25 going to object, but it's going to open up an area

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2473

1 that the court has ruled on if counsel proceeds on
2 this line of questioning.

3 MR. BERNICK: I'm -- I'm not --

4 MR. CIRESI: And it's a motion that they
5 brought.

6 MR. BERNICK: Your Honor, he just said he
7 didn't know, so I'm not going to pursue it.

8 MR. CIRESI: But those types of questions,
9 Your Honor, open up the door on that issue that --

10 THE COURT: Counsel, I can't rule in
11 anticipation of something. He's answered the
12 question and the answer will stand.

13 BY MR. BERNICK:

14 Q. Now when it came to actually looking into
15 manipulated tar-and-nicotine ratios, isn't it a fact
16 that the documents that you have shown to the jury --
17 I'll begin with Exhibit 10529 -- show that there were
18 problems of consumer acceptance, that is, taste, when
19 tar-to-nicotine ratios were changed significantly?
20 Doesn't this state, "Several years ago, during the
21 discussion of a presentation I made of smoker
22 preferences related to nicotine/tar ratio, Cliff
23 Goldsmith commented that the lack of acceptance of
24 high nicotine to tar ratios (greater than ten) may be
25 due to the harshness or taste unpleasantness that

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2474

1 could be masked, implying that if such masking could
2 be achieved, perhaps higher nicotine to tar ratios
3 would be marketable?" Is that what that document
4 says?

5 A. What was that number?

6 Q. 10529.

7 A. Well yes, that's -- you read it correctly,
8 that's what it says. I just wanted to have the full
9 document in front of me.
10 Q. And in point of fact, isn't it also true that
11 when it came to the Y1 tobacco, that was a high
12 nicotine strain; was it not?
13 A. Yes, it was.
14 Q. Isn't it also a fact that when it came to the Y1
15 tobacco, when used as a basic -- as a new -- whole
16 new kind of tobacco, it was found that consumers
17 didn't like the taste? Wasn't that the problem with
18 Y1?
19 A. Oh, I'm not familiar with what the consumer
20 acceptance was with the products that you put Y1
21 into.
22 Q. Are you familiar with the consumer acceptance
23 that was found in the course of research on Y1?
24 A. Not that I'm aware of.
25 Q. Are you familiar with the consumer acceptance
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2475

1 that was found in connection with research on high
2 nicotine-to-tar ratios?
3 A. Well that's a very general question. I
4 certainly am reminded of -- of several hours of
5 videotape that I watched having to do with R. J.
6 Reynolds discussing their Project XB.
7 MR. BERNICK: Your Honor, move to strike.
8 There's no videotape that's in evidence.
9 MR. CIRESI: He asked an open-ended
10 question.
11 THE COURT: Well I'll allow him to
12 answer --
13 Have you finished your answer?
14 THE WITNESS: No. I was going to continue.
15 THE COURT: Allow him to finish his answer.
16 I don't know if it's responsive or not.
17 A. This was a -- a two-day meeting that was held at
18 RJR, and it was videotaped, and they were discussing
19 a Project XB where they were having an issue of
20 dealing with high nicotine-to-tar ratios and -- and
21 concerned with the taste and -- and harshness that
22 accompanied this -- this approach, and so they were
23 back adding acid into the tobacco material to try to
24 modulate the -- the levels. And I could see in
25 watching the videotape the fact that they were in
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2476

1 fact terrifically concerned as to not only the high
2 nicotine-to-tar level delivering more nicotine, but
3 they could see that the irritation was coming from
4 too much free base nicotine. And as they said in --
5 in that movie or in that video, they were going to
6 have to back out and modulate the acid so they could
7 sneak the nicotine by and get it into the lungs.
8 MR. BERNICK: Your Honor, move to strike
9 the editorial comment about sneaking. The tape is
10 not in evidence.
11 THE COURT: Okay. The last sentence will

12 be stricken. The rest of it will stand as
13 responsive.
14 BY MR. BERNICK:
15 Q. Is it a fact that in doing research with regard
16 to the high nicotine-to-tar ratios, research -- the
17 tobacco companies gave research products, that is,
18 research-designed cigarettes, to test panels to test
19 consumer acceptance internally? Didn't they do that?
20 A. Well I don't know. Are you referring to
21 something specific that you'd want to talk about?
22 Q. I'm talking --
23 A. I mean you just make a very general statement,
24 and I don't know whether they did or not.
25 Q. Well let me just ask this then: Are you
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2477

1 familiar with the fact that in doing research on new
2 cigarette designs, it's been the standard practice
3 for years for tobacco companies, when they have a new
4 research idea, to give those cigarettes to taste
5 panelists and see how they like them?
6 A. Oh, I testified to that on my direct.
7 Q. Okay. That's why I asked you the question.
8 So those panels did in fact -- were in fact used
9 to design -- to find out whether products will be
10 acceptable to consumers; correct?
11 A. Yes, that's my understanding.
12 Q. Okay. And all I'm asking you is whether in fact
13 what the industry found in doing this research on
14 high nicotine-to-tar ratios was the consumer panels
15 didn't like the taste? Isn't that what they found?
16 A. I gave you the example that I could -- the
17 specific example I could recollect where there was a
18 problem of it.
19 Q. Okay.
20 A. And --
21 Q. Didn't they find the same thing with regard to
22 Y1?
23 A. I already answered that one.
24 Q. Okay. Now in point of fact, at the end of the
25 day when we come down to what actually happened with
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2478

1 the nicotine deliveries over time, isn't it a fact
2 that by 1987, the -- let me rephrase the question.
3 Compensation, higher nicotine-to-tar ratios,
4 weren't they researched during the period --
5 internally researched during the period of the 1970s
6 and 1980s? Wasn't that a period of time during which
7 the research was done?
8 A. Well compensation -- the potential for
9 compensation is built into this device by virtue of
10 the fact that the smoker has total control over the
11 deliveries, and so it's -- it's been in the design
12 all the time. It's just that you've added features
13 to cigarettes over time that make additional ways for
14 compensation to -- to happen.
15 Q. Could you --
16 I'll try to put my question again so it's real

17 clear what I'm asking you. Isn't it a fact that the
18 industry did research on changing nicotine-to-tar
19 ratios, did that research during the period of the
20 1970s and the 1980s, as shown in the documents that
21 you've shown to the jury?

22 A. Well they were concerned about tar and nicotine
23 levels all the along, and particularly when you get
24 to this period, this is when the documents came out
25 dealing with the lower threshold dose and the -- and

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2479

1 the problem that they were going to face with falling
2 through this dose-range window if they didn't
3 manipulate the nicotine in some way in order to
4 salvage what was looking to be a pretty disastrous
5 situation for the business. This in turn caused them
6 to want to research high nicotine-to-tar cigarettes
7 which gave rise to the problems he's pointed out, and
8 they had to address those and -- and solve them.

9 They also built in, through their design,
10 compensatory alternatives which in effect allowed the
11 smoker to adjust their dose in order to get the
12 nicotine that they desired.

13 MR. BERNICK: Move to strike, Your Honor,
14 as not being responsive to the question.

15 THE COURT: It is non-responsive.

16 MR. BERNICK: I'm sorry?

17 THE COURT: It is non-responsive.

18 MR. BERNICK: Okay.

19 Q. Question is a very narrow historical one. Okay?
20 All I'm asking you is --

21 We've been talking about tar-to-nicotine ratios
22 and the research into tar-to-nicotine ratios, and all
23 I'm asking you -- real simple -- is didn't that
24 research take place during the 1970s and into the
25 1980s as reflected in the documents that you've shown

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2480

1 to the jury?

2 A. Just --

3 You're saying that in 1970 they suddenly started
4 doing research on tar-to-nicotine ratios and then it
5 took off after that? Is that what you're suggesting?

6 Q. I'm suggesting to you what the documents that
7 you showed to the jury on direct examination showed,
8 which is that that research into tar-and-nicotine
9 ratio changes took place in the 1970s and 1980s.

10 THE COURT: Counsel.

11 MR. CIRESI: Objection.

12 THE COURT: Yeah. That's not a proper
13 question. Your first question was okay.

14 MR. BERNICK: Okay. I'll go back to that
15 one.

16 THE COURT: All right.

17 BY MR. BERNICK:

18 Q. The timeframe for the research into actually
19 changing tar-to-nicotine ratios, setting about doing
20 that as a research item, didn't that take place in
21 this period of time in the 1970s and 1980s?

22 MR. CIRESI: Objection, misstatement of the
23 evidence.

24 THE COURT: You may answer that.

25 A. I haven't thought of it in terms of a time where
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2481

1 that suddenly started.

2 Q. Is it a fact, Dr. Robertson, that as the brands
3 continued to develop, the sales-weighted average of
4 nicotine during this period of time continued on as
5 indicated in this chart?

6 A. Well I -- I -- I take the chart for what it is.

7 Q. Okay. And isn't it also true that if we wanted
8 to reflect the range, the total range of nicotine
9 deliveries that were in fact made available, we would
10 go as high as about 1.4 milligrams all the way down
11 to .1 milligrams; that is, you could go buy
12 cigarettes today that would have a measured delivery
13 of as little as .1 milligrams of nicotine? Isn't
14 that a fact?

15 A. Yeah, if you smoked it like an FTC machine does.

16 Q. I'm asking what you could buy. Could you go out
17 to the store today and buy a cigarette that has a
18 measured delivery of .1 milligrams of nicotine?

19 A. I think we asked -- you asked me that before
20 and the answer was yes. It's printed on the -- on
21 the box. That doesn't have anything to do with what
22 a person might get delivered to them, however.

23 Q. We'll get to compensatory behavior in just a
24 moment. I'm just asking what the rate of delivery of
25 nicotine is for those cigarettes. .1 milligrams;

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2482

1 correct?

2 A. There are brands on the market that give .1
3 milligram as per the FTC method.

4 Q. Now what I had asked about before was tar.
5 Likewise, if we use the scale over there, the tars go
6 down to what is on that scale one milligram of tar;
7 right, as measured by the FTC machine?

8 A. That's my understanding, yeah.

9 Q. In fact, isn't it also true that while all of
10 this discussion was taking place about nicotine, that
11 Philip Morris actually came out with a new product
12 called Accord? Accord has come out more recently;
13 correct?

14 A. Actually I'm not very familiar with Accord.

15 Q. And even earlier there was a product called Next
16 that had come --

17 MR. CIRESI: Excuse me, Your Honor. Accord
18 was post-'94. Discovery was cut off. Counsel knows
19 that.

20 MR. BERNICK: Okay. I won't --

21 THE COURT: Counsel -- counsel, just a
22 moment, please. Would you allow the court to rule?

23 MR. BERNICK: Sure.

24 THE COURT: The objection is sustained.

25 MR. BERNICK: Okay.

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2483

1 BY MR. BERNICK:
2 Q. I'd like to talk about the Next product. Do you
3 remember the product called Next?
4 A. Yes.
5 Q. I'm at the side here. It's hard to read.
6 And in fact, isn't the Next product a product
7 that has virtually no nicotine? Wasn't that put out
8 into the marketplace to see if people would buy it?
9 A. Yes. It was a very low nicotine product, and my
10 understanding is that people didn't buy it.
11 Q. So that during this period of time, when it
12 comes to the FTC rate of deliveries of nicotine,
13 consumers had a option to buy higher nicotine
14 products all the way down to products that have
15 almost no nicotine; correct?
16 A. Yeah, they had that option. But as you can see,
17 once you drop through that threshold window, nobody
18 wants it.
19 Q. Right. Nobody wanted to buy a cigarette that
20 had no nicotine. You couldn't sell it; right?
21 A. It didn't have any pharmacological effects.
22 That's why they didn't want it.
23 Q. Whatever the reason was, people didn't buy the
24 zero nicotine product; correct?
25 A. For that reason.

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2484

1 Q. Okay. Now, so people want cigarettes and they
2 want some nicotine, for whatever reason, Dr.
3 Robertson. Haven't they been afforded the option of
4 buying cigarettes with different rated deliveries of
5 nicotine?
6 A. Well for whatever reason, as a pharmacologic
7 effect. And yes, they have that -- that option, but
8 as we all know, the .1 milligram cigarettes can be
9 smoked up to a much higher nicotine delivery through
10 compensation, which the industry designed into the
11 device.
12 MR. BERNICK: Move to strike the last
13 statement in the answer.
14 MR. CIRESI: Well Your Honor, it was a
15 repetitious question and the answer is responsive.
16 THE COURT: Well the question is
17 repetitious, so the answer shouldn't stand.
18 BY MR. BERNICK:
19 Q. In exact when it comes to the issue of
20 compensation by today's science, Dr. Robertson, after
21 this issue has now been looked at for more than 25
22 years, isn't it a fact -- and this is Exhibit
23 GK00016 -- isn't it a fact that according to --
24 MR. CIRESI: Excuse me, counsel. May I get
25 it, first?

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2485

1 THE WITNESS: Where is this?
2 MR. BERNICK: GK00016, volume one, tab 19.

3 MR. CIRESI: Object to the use of the
4 exhibit with this witness until appropriate
5 foundation is laid, Your Honor.
6 Your Honor, they display it on the over -- on
7 the overhead before the exhibit has had properly laid
8 foundation with this witness.
9 MR. BERNICK: The exhibit is in evidence,
10 Your Honor.
11 MR. CIRESI: It's an 803(18). Foundation
12 must be laid for each witness, counsel.
13 MR. BERNICK: Tab 19.
14 THE WITNESS: I'm working on it.
15 MR. BERNICK: Okay. Sorry.
16 BY MR. BERNICK:
17 Q. Haven't Drs. Benowitz and Henningfield concluded
18 in their publication in the New England Journal of
19 Medicine, July 14, 1994, that "Overcompensation,
20 i.e., inhaling more smoke from low-nicotine
21 cigarettes than from higher-yield brands, appears,
22 however, to persist for only for days or weeks. In
23 longer-term studies of carbon monoxide exposure after
24 subjects switched to low-yield cigarettes,
25 compensatory oversmoking appears not to persist."

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2486

1 Was that the conclusion that these researchers
2 reached in July of 1994?

3 MR. CIRESI: Your Honor, I'm going to
4 object to the inappropriate use of the exhibit until
5 appropriate foundation has been laid. I don't want
6 to keep popping up if we --

7 Counsel should follow the rules, which he
8 presumably knows.

9 THE COURT: All right. The objection is
10 sustained.

11 BY MR. BERNICK:

12 Q. Dr. Robertson, are you familiar with Drs.
13 Benowitz and Henningfield?

14 A. I'm familiar with them, yes.

15 Q. Okay. Isn't it a fact that those two
16 individuals are some of the best-known authorities
17 today in the field of smoking behavior?

18 A. I know they're well-known, yes.

19 Q. Okay. And isn't it true that the New England
20 Journal of Medicine is a peer-reviewed journal?

21 A. Yes. I think most of the articles in there are
22 peer reviewed.

23 Q. Okay. This would be one of the most prestigious
24 peer-reviewed journals in the country; correct?

25 A. That doesn't make any sense to me. It's a good

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2487

1 journal. There's lots of good journals.

2 Q. Well if it doesn't make sense, that's fine.

3 And isn't it a fact that what they have
4 published here is an article that specifically
5 pertains to what you talked about as establishing a
6 nicotine threshold addiction -- for addiction? Isn't
7 that the subject matter of this article?

8 A. Well why don't you give me a chance to look it
9 over and I'll let you know.
10 Q. Okay. Fine.
11 Have you read this before?
12 A. I've seen it, but I haven't read it carefully,
13 so I'll need to look at it.
14 THE COURT: Counsel, the exhibit should not
15 be displayed until --
16 MR. BERNICK: Oh, Okay.
17 THE COURT: -- you have laid the
18 foundation.
19 MR. BERNICK: Okay.
20 A. Well I think I have the -- the gist of it.
21 Q. Okay. And Dr. Robertson, just taking a step
22 back, in the materials that you've submitted are a
23 list of additional articles that you have read from
24 time to time in connection with your work on this
25 case. Isn't it a fact that you have cited and relied
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2488

1 upon other articles that have been written by Drs.
2 Benowitz and Henningfield?
3 A. Yes, I think that's -- that's possible.
4 Q. Okay. And do Drs. Benowitz and Henningfield in
5 this -- in the context of this article speak to the
6 issue that you addressed on direct examination, which
7 is the issue of compensation?
8 A. Well the issue that I addressed on my direct was
9 the design of elements that permit compensation to
10 occur.
11 Q. All right.
12 A. I didn't talk about anyone's behavior or whether
13 they compensate, whether they choose to or not.
14 Q. Oh.
15 A. Just that the elements, the elements are there,
16 and the presumption is is that some people in fact do
17 take advantage of that. And the -- the articles
18 would show that particularly when they go to these
19 lower delivery brands.
20 Q. Okay. Well let me just then be clear, because
21 I -- that's fine that you point that out.
22 Are you saying that you cannot testify as an
23 expert to this jury that compensation, long-term
24 compensation in fact occurs? Is that what you're
25 telling me?

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2489

1 MR. CIRESI: Your Honor, it's outside the
2 scope of direct. That was the testimony of Dr. Hurt.
3 THE COURT: Okay. Well I'll allow him to
4 answer that question.
5 Q. Do you remember the question, Dr. Robertson?
6 A. Yes, I can tell you that the -- from a design
7 point of view, the elements for compensation are
8 present in -- in the cigarette. In terms of how that
9 translates into the use of that by any smokers,
10 long-term, short-term or otherwise, I -- I have not
11 looked into the behavioral patterns other than what's
12 been reported in your own -- in your own documents.

13 Q. In the internal documents.
14 A. In the internal documents.
15 Q. So you're not offering an opinion today as an
16 expert to say that in fact people do compensate long
17 term; would that be fair?
18 MR. CIRESI: Asked and answered. He's
19 already testified to that.
20 MR. BERNICK: Your Honor, this is a very --
21 I want to be clear that he is not offering this
22 opinion. If he does, I want to use this document; if
23 he doesn't, I won't have to use it.
24 MR. CIRESI: Your Honor --
25 THE COURT: My understanding is that he's
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2490

1 not an expert in the use of long-term or short-term,
2 so I believe the question has been answered.
3 MR. BERNICK: Okay.
4 THE COURT: And I believe it's clear.
5 MR. BERNICK: Okay.
6 BY MR. BERNICK:
7 Q. And if we now assume for purposes of your
8 testimony, Dr. Robertson, that compensation does not
9 occur, isn't there in fact a change that affected the
10 deliveries to smokers of these materials, tars, over
11 the years? If we assume that compensation does not
12 occur over the long term, haven't smokers now been
13 able to reduce their intake of these materials?
14 MR. CIRESI: Objection.
15 Q. Did you make that assumption?
16 MR. CIRESI: Objection. It's a blatant
17 misstatement of the evidence in this case.
18 THE COURT: It is a misstatement, counsel.
19 MR. BERNICK: I'm asking him a question
20 about cigarette design.
21 THE COURT: Counsel.
22 MR. BERNICK: I'll -- may I rephrase my
23 question?
24 THE COURT: Rephrase it.
25 BY MR. BERNICK:

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2491

1 Q. If in fact compensation does not occur long
2 term, Dr. Robertson, haven't there been changes to
3 the design that will effectively deliver lower
4 amounts of tar to the consumer?
5 MR. CIRESI: Objection, misstatement of the
6 evidence.
7 THE COURT: The objection is sustained.
8 BY MR. BERNICK:
9 Q. Let's talk a little bit about the nicotine line
10 on this chart, Dr. Robertson. That's the bottom line
11 there.
12 If we go back to the key elements that you
13 pointed out on your direct examination, these right
14 here, I want to ask some questions of you regarding
15 the nicotine delivery of the tobacco rod, and I want
16 to put back on the chart out of the 1979 report that
17 we had reference to this morning.

18 Do you see that there is a column for nicotine
19 in that chart, too, at the -- at the page 14-114?
20 A. Okay.
21 Q. And do you see if you come down to the bottom
22 there and you run your finger across -- I'll have to
23 go a little bit wider here -- that when it comes to
24 the tobacco rod, reconstituted sheet, according to
25 this chart, has the effect of reducing nicotine? Do
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2492

1 you see that?
2 A. Yes, I see that.
3 Q. Isn't it a fact that in the videotapes that you
4 showed -- let me get at it this way.
5 If we have a tobacco plant, which I will draw
6 like that -- not with nearly as much artistry as I
7 note that you have. Okay? Isn't it a fact --
8 MR. CIRESI: I stipulate to that, Your
9 Honor.
10 Q. This is supposed to be a tobacco plant.
11 A. Is that a compliment?
12 Q. Yes. It better be a compliment; I'm an admirer
13 of your drawings.
14 A. Thank you.
15 What is that?
16 (Laughter.)
17 Q. If you -- if you squint and use some
18 imagination --
19 I'll -- I'll give you a label. I'll say it's a
20 tobacco plant. Okay? And -- and even though it's
21 crude, it will suffice for this purpose because I
22 have a very simple question for you.
23 MR. BERNICK: Even yours aren't this bad.
24 Q. If we go to the leaf versus the stalk and even
25 distinguish the stem, isn't it true that those
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2493

1 different components of the plant have different
2 nicotine contents naturally?
3 A. Yes.
4 Q. I'm sorry?
5 A. Yes.
6 Q. Okay. And in point of fact, if we go to the
7 leaf, the lamina, that has the highest nicotine
8 content; true?
9 A. Yes.
10 Q. Okay.
11 A. I'd agree with that.
12 Q. If we go to reconstituted tobacco, which you
13 described in your testimony yesterday, I think you
14 told us that reconstituted tobacco is largely in a
15 sense using wastage, things that have been stripped
16 out of the process; correct?
17 A. Well it uses part of the plant, uses the stems
18 that have to be reprocessed to be included, but it
19 also includes waste materials that are collected in
20 and around the plant and also broken leaves that come
21 from the stemmery and so forth that can't be
22 processed with the lamina.

23 Q. Isn't it a fact that reconstituted tobacco, just
24 in terms of the materials, is a lower nicotine
25 material than the lamina?

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2494

1 A. Yes, I think that's generally true.

2 Q. Okay. Isn't it also true that you -- you showed
3 them the -- you pointed out in the video that at a
4 certain point in the process, you know, materials are
5 extracted from the -- the plant, there's an extract
6 that then later on is added back in. Do you remember
7 that?

8 A. There's a water-soluble extract --

9 You're talking about the -- the paper process
10 now.

11 Q. The paper process, that's right.

12 A. And so there is a water-soluble extract that is
13 removed in the pulping process which is then
14 concentrated, and then to which a number of
15 additional chemicals are added, and then that's put
16 back on the -- on the sheet that's been made.

17 Q. Isn't it a fact that throughout all those
18 extraction processes, the net effect is that there is
19 less nicotine in the recon at the end of the plant
20 than there was at the beginning?

21 A. Well to the extent that there's losses in the
22 process, since the nicotine -- there will be nicotine
23 certainly carried in that extract, if there's losses,
24 wastage or whatever, then there would be less
25 nicotine in -- in -- in principle.

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2495

1 Q. And are those some of the reasons why we see
2 that when recon gets added, the net effect is to
3 reduce the nicotine content of the tobacco in the
4 rod?

5 A. Well it's probably not losses necessarily, other
6 than you are starting with a material that has less
7 nicotine in it.

8 Q. Okay. So as we add more recon to the plant,
9 all -- strike that.

10 As we add more recon to the tobacco rod, all
11 other things being equal, the nicotine content of the
12 rod goes down; correct?

13 A. If you take something out that had a higher
14 nicotine content.

15 Q. Okay. If we talk about expanded tobacco, is
16 that another area -- you have expanded tobacco used
17 in this rod -- where use of expanded tobacco would
18 result in lower nicotine content in the cigarette
19 rod? Is that true?

20 A. If you're taking out non-expanded material and
21 putting expanded back in, it has -- it's a
22 lower-density material.

23 Q. The cellulose acetate filter, they have the
24 effect of trapping nicotine that's entrained in the
25 smoke and thereby reducing the amount of nicotine

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1 that comes out to the smoker.
2 A. Well those filters do remove both tar and -- and
3 nicotine. They tend to be a little bit more
4 preferential for the tar than for the nicotine. But
5 they will remove some, yes.
6 Q. All right. So if we -- we took this filter off
7 and just this smoke coming out here, there would be a
8 higher nicotine content -- or higher nicotine
9 delivery in the smoke than if you put that filter on;
10 correct?
11 A. Yes.
12 Q. Okay. And likewise with the ventilation holes,
13 those have the effect of diluting the nicotine
14 content; correct? Diluting the smoke as a whole, and
15 to that extent, diluting the nicotine; correct?
16 A. That's a little trickier because ventilation
17 does a lot of other things as well. But from the
18 standpoint, just the sheer standpoint of dilution, it
19 has that effect. It also has other effects that have
20 been shown in the -- in the data, such as raising the
21 pH of the smoke.
22 Q. Okay.
23 A. Which, of course, then, causes some of the
24 nicotine to become free base, making it functionally
25 more effective.

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1 Q. But the total net delivery of the nicotine in
2 the smoke with a filter is less than without a filter
3 in part by reason of those ventilation holes;
4 correct?
5 A. In terms of mass, but not necessarily in terms
6 of form.
7 Q. The amount. The amount's lower because of
8 ventilation; correct?
9 A. That's what I said.
10 Q. Okay. Now I want to pick up on one other thing
11 that you raised just to clarify a little bit. You
12 showed the jury a document called
13 "ELASTIC/COMPENSATABLE PRODUCTS." It is Exhibit
14 11275.
15 A. Okay.
16 Q. Okay. This is the one that talked about elastic
17 and compensatable products, and here's the concept,
18 "Irrespective of the ethics involved, we should
19 develop alternative designs (that do not involve
20 obvious criticism) which will allow the smoker to
21 obtain significant enhanced deliveries should he so
22 wish." You referred to that on direct examination;
23 did you not?
24 A. Yes, I did.
25 Q. Do you know what particular filtration system

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1 was under consideration in connection with that? Do
2 you know?
3 A. Well it doesn't speak to a filtration system

4 there.
5 Q. So you don't -- you just don't really know
6 exactly what particular design or product was being
7 referred to there as a research item; would that be
8 fair?
9 A. Well it doesn't speak to what alternative
10 designs, at least directly, are being considered in
11 order to design compensation elements into the --
12 into the product.
13 Q. Fine.
14 Now I want to turn to the issue of pH. Again
15 the time is mid-1970s. Compensation --
16 Oh, I'm sorry. You said you didn't know exactly
17 when compensation arose as an issue. Let me ask you
18 this question then. Are you familiar --
19 MR. CIRESI: Excuse me, counsel. Object to
20 the characterization -- mischaracterization of the
21 evidence.
22 MR. BERNICK: I'll withdraw it. I'll
23 withdraw it.
24 THE COURT: Yes, do withdraw it, counsel.
25 BY MR. BERNICK:

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2499

1 Q. In the mid-1970s, I think you've pointed out --
2 let me just draw a little time line here -- you've
3 told the jury about a number of documents that were
4 written in this period of time, in the early 1970s,
5 where companies are addressing the issue of how pH
6 would affect their design and the attractiveness of
7 cigarettes. Do you recall that?
8 A. Yes. There were documents that went back into
9 the 1970s. Perhaps there were some that were
10 earlier. I didn't keep a mental note of the dates.
11 Q. This was a period of time where people were
12 becoming very watchful of what was happening to
13 Marlboro; correct?
14 A. Even perhaps a little earlier than that.
15 Q. Okay. Isn't it a fact that during exactly the
16 same period of time; that is, in the mid-1970s, the
17 National Cancer Institute was suggesting that the
18 tobacco industry should look into the possibility of
19 altering pH in order to make low delivery cigarettes
20 more attractive? Are you familiar with that?
21 A. I didn't see any reference to that in -- in the
22 internal documents that I recall. What I do recall
23 is that the industry was considering those kinds of
24 manipulations far earlier.
25 Q. Well we'll get into that in a minute. I'm just

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2500

1 asking you about the mid-1970s. And this is exhibit
2 GI27. It's already in evidence.
3 Isn't it a fact that during this period of
4 time --
5 A. Where can I find that?
6 Q. This is at tab -- volume one, tab 10.
7 MR. CIRESI: Your Honor, again, can we have
8 it off the overhead, please, counsel?

9 MR. BERNICK: Well, Your Honor, I believe
10 that the rule on learned treatises says that if the
11 document is established to be a learned treatise
12 through expert testimony, it doesn't have to be this
13 expert, it can still be used as the rule says. And
14 this is already in evidence. It's been established
15 as a learned treatise through Dr. Hurt.

16 MR. CIRESI: That's not the complete rule.
17 Has to be called to the attention of the witness
18 through cross-examination or established by a witness
19 on direct to be used with that witness.

20 THE COURT: Okay. You'll have to lay a
21 foundation with this witness if you're going to
22 cross-examine him on this treatise.

23 BY MR. BERNICK:

24 Q. Are you familiar, Dr. Robertson, with the
25 proposal that was made by the National Cancer

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2501

1 Institute in 1976 to do research on changing pH in
2 order to make low delivery cigarettes more attractive
3 to consumers?

4 MR. CIRESI: You know, Your Honor, I'm
5 going to object to the form of the question. Counsel
6 keeps testifying with regard to his questions.

7 THE COURT: You may answer the question.

8 A. No.

9 Q. Have you made any inquiry to determine what the
10 public health authorities were saying about pH and
11 low delivery cigarettes during any of this period of
12 time, 1970s, 1980s?

13 A. Well in the literature search that I did such
14 information did arise, and I didn't see that
15 mentioned as a -- in the internal documents, as I
16 recall, as any motivation for the reason that it was
17 being done by the industry.

18 Q. Did you do a literature search into what the
19 National Cancer -- any public health authority was
20 saying?

21 A. I was doing literature searches in -- or
22 attempting to, in terms of cigarette design and
23 design parameters, and it didn't turn up anything of
24 that nature.

25 Q. In fact, isn't it true that your literature

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2502

1 search you referred to earlier, this is a literature
2 search that you did in the chemistry library at your
3 university; correct?

4 A. Seems a reasonable place to do it.

5 Q. I just asked you whether that's where you did
6 it. Is that where you did it?

7 A. No, I did it in my office as well, because I'm
8 connected to the Los Alamos National Laboratory,
9 which has probably the most extensive database
10 present to universities.

11 Q. I see. Did you do a literature search to find
12 out what the public health authorities were saying
13 about pH and cigarette design?

14 MR. CIRESI: Objection, asked and answered.
15 MR. BERNICK: No, I don't think --
16 THE COURT: That's been asked and answered.
17 MR. BERNICK: Let me make it very specific.
18 I believe it's a new subject matter, but I'll -- I'll
19 try to frame it so it's very specific.
20 THE COURT: That question was asked and
21 answered, so rephrase your question.
22 BY MR. BERNICK:
23 Q. Did you frame a literature search to
24 specifically look into what the public health
25 authorities were saying about pH and cigarette
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2503

1 design? Did you do a literature search specifically
2 on that issue?
3 A. Asking that very question --
4 Q. Yes.
5 A. -- in a phrase? I did not ask that very
6 question in a phrase.
7 Q. I'd like to talk a little bit about what
8 actually is some of the chemistry that I think you've
9 referred to, at least in part, about pH. I think
10 what you testified to on direct examination was that
11 if you add ammonia to tobacco, all other things being
12 equal, all other things being equal, pH goes up; is
13 that accurate?
14 A. pH of what?
15 Q. Smoke.
16 A. The smoke that comes off of that tobacco?
17 Q. The smoke that comes off that tobacco, yes.
18 A. One would anticipate that would be the -- the
19 result if there were no other changes in the -- the
20 ammoniated -- the way -- the manner in which you
21 ammoniated it was such that the ammonia remained
22 present.
23 Q. Okay. And if pH goes up, as I understand your
24 testimony -- again all other things being equal --
25 free nicotine will go up as well in the smoke; right?

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2504

1 Correct?
2 A. To the extent that the -- that that pH effect is
3 felt in the droplet, and if you shift the
4 equilibrium, you will shift the equilibrium more to
5 free base, free base concentration will rise both
6 inside the droplet and outside.
7 Q. Now I want to add to the recipe. You've talked
8 about the importance of a recipe in your direct
9 examination; correct?
10 A. Right. In fact when I toured the cigarette
11 facilities, that's what they called it as well.
12 Q. Good. It's a good name.
13 Let's add sugar. If we add sugar together with
14 the ammonia -- let's -- let me do it this way. Let's
15 begin with the ammonia and then see what happens to
16 pH. Now we add sugar. What is the effect that
17 adding sugar has on pH?
18 A. Well when the smoke is combusted, depending on

19 what the sugar content is, as we -- as we saw in that
20 one example, as the sugar content increases,
21 generally there are more acidic compounds formed in
22 the smoke, and the tendency of those compounds would
23 be to cause the pH to shift to a lower value.

24 Q. So it would go down.

25 A. That's typically what you would expect, yes.

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2505

1 Q. And would you then expect that free nicotine
2 would also go down?

3 A. If you're doing this sequentially --

4 Q. As --

5 A. -- or --

6 Q. As compared to pure ammonia addition, if you're
7 also adding sugar, isn't that the -- isn't the effect
8 to reduce the free nicotine?

9 A. If the pH of the droplet where the nicotine
10 resides is decreased, then the equilibrium will shift
11 more toward the bound form.

12 Q. Bound form.

13 A. The salt form. You would expect that.

14 Q. And where you end up in pH and where you end up
15 in free nicotine depends on how much ammonia you have
16 and how much sugar you have, what the recipe is;
17 right?

18 A. Well among a whole lot of other complements that
19 are in there as well.

20 Q. All the things being equal, it depends on what
21 your recipe is; true?

22 A. Yes.

23 Q. Okay. Now if we talk about the types of tobacco
24 that are used, I think you've mentioned in your
25 testimony burley tobacco; correct?

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2506

1 A. Yes.

2 Q. And you've also mentioned flue-cured or bright;
3 right?

4 A. Yes.

5 Q. And those are the two types of leaf that are
6 most predominant in blends today; correct?

7 A. They occupy most of the fraction. There's --
8 there's also oriental and some Maryland.

9 Q. Okay. If we took the burley leaf, isn't it true
10 that burley has a higher content of ammonia
11 naturally? Burley, when it's grown and cured, ends
12 up having a higher ammonia content; true?

13 A. It has a higher nitrate content.

14 Q. Doesn't it have a higher ammonia content? Or do
15 you know?

16 A. Well I'd have to see the analyses, depending on
17 whether or not it was made for -- just to be sure
18 that none of the nitrates were converted to ammonia
19 in the analysis. You know, it's very -- there are a
20 lot of ways this can be -- this can be measured. So
21 if it's actually natural ammonia in the plant --

22 Q. Do you know one way or another whether --

23 MR. CIRESI: Excuse me.

24 MR. BERNICK: I'm sorry.
25 MR. CIRESI: Can the witness finish, Your
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2507

1 Honor?
2 THE COURT: Please allow the witness to
3 finish.
4 MR. BERNICK: Sure.
5 A. What I -- what I do know is that the naturally
6 occurring ammonia in tobacco in general is -- is
7 quite low. And how it varies among the various types
8 of tobacco, I don't carry that around in my -- in my
9 head. And I don't recall if I've seen, you know,
10 natural ammonia levels other than they're -- they're
11 low.
12 Q. Do you know, as an expert sitting here today,
13 Dr. Robertson, whether or not burley tobacco has
14 ammonia in it naturally?
15 A. I believe it does. And I believe it would
16 make just sense from what I know about it that it
17 might have higher ammonia values than -- than the
18 others because it has this higher nitrate content.
19 Q. What was -- what was the other -- what's the
20 other big kind? Flue-cured, isn't it? Flue-cured,
21 the other one?
22 A. Flue-cured.
23 Q. Isn't it true that flue-cured tobacco is higher
24 in sugar content naturally? Naturally. Correct?
25 A. Well actually it's the way it's cured where the
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2508

1 enzymatic reactions are allowed to decompose the
2 polysaccharides in the plant into the basic sugar
3 units which is induced by the manner in which the
4 plant is topped and cultivated.
5 Q. If you add --
6 If you have a recipe that's more heavily
7 involved with burley, has more burley in it, isn't
8 the effect of adding more burley to increase pH and
9 increase free nicotine?
10 A. Yes. And there's data that --
11 Q. Yeah.
12 A. -- would -- would show that to be the case.
13 Q. Separate and apart from whether you're adding
14 ammonia or adding sugars, all you have to do is add
15 burley and you can push the pH up; right?
16 A. Right. That's one way of changing and
17 manipulating pH, right.
18 Q. And even if you were not adding ammonia or
19 adding sugar, if you added more flue-cured, the
20 effect is to bring pH down and the free nicotine
21 down; true?
22 A. All things remaining equal, as we've been
23 talking.
24 Q. Okay. And again, whether --
25 Again, forget about adding ammonia or adding
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1 sugar. Whether a given tobacco smoke is high or low
2 in pH will depend upon how much burley and how much
3 flue-cured are in the blend; correct? All other
4 things being equal.
5 A. That will certainly contribute to that.
6 Q. Okay. Now for how long has it been true in the
7 United States that cigarettes have been blended with
8 a mix of burley and flue-cured?
9 A. I don't know when that -- when that began,
10 although at least as far back as the documents that
11 I've read. So you supplied -- the defendants
12 supplied that that blend has been in place, and I
13 think it's -- there is data that shows that at least
14 since the 1950s the fraction of burley has slowly
15 increased up until the present day.
16 Q. Isn't it true that this blend, including also
17 oriental, was part of Camel cigarettes in the 1920s?
18 A. Well I haven't studied Camel cigarettes in the
19 1920s.
20 Q. So you don't know how old this technology is of
21 mixing these two types of tobacco together; do you?
22 A. That's just what I said. I said I traced it
23 back to the -- essentially the beginning of the
24 documents that have been supplied in this case, which
25 showed it was in place in the -- in the 1950s.

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2510

1 Q. I want --
2 MR. CIRESI: Excuse me, counsel. Your
3 Honor, if the defense wishes to supply documents back
4 that far --
5 They were not supplied back that far. It's
6 outside the scope of discovery.
7 MR. BERNICK: Dr. -- Dr. Hurt testified
8 about Camel cigarettes in the 1920s.
9 MR. CIRESI: Your Honor --
10 THE COURT: Are we going to have a
11 discussion on the 1920 Camel cigarettes?
12 MR. BERNICK: Well I think it's important
13 to understand that these issues of pH and mix are not
14 a function of something that happened just within the
15 last 20 or 30 years. They have been out there for
16 decades and decades. That's the force of the
17 question.
18 MR. CIRESI: That wasn't --
19 THE COURT: The force of the answer was
20 that he doesn't know.
21 MR. BERNICK: I understand that.
22 THE COURT: Let's move on.
23 MR. BERNICK: Okay.

24 BY MR. BERNICK:

25 Q. If we go outside of the U.S. to Canada and to
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2511

1 Britain, isn't it true that their cigarettes use
2 flue-cured?
3 MR. CIRESI: Outside the scope of discovery
4 and scope of the expert testimony.

5 MR. BERNICK: Your Honor, there was --
6 THE COURT: Sustained.
7 BY MR. BERNICK:
8 Q. Do you recall submitting on direct examination
9 to the jury documents from BATCo dealing with
10 different pH levels associated with different types
11 of cigarettes?
12 MR. CIRESI: Your Honor, the documents
13 provided with regard to the formulas were provided
14 only for U.S. brands and only up until 1994, and they
15 did not go back to 1920. The B.A.T documents are
16 documents that relate to research and development
17 which were shared with Brown & Williamson Company,
18 one of the family members of Brown -- of the BAT
19 Group.
20 THE COURT: All right. Counsel, is there
21 an objection?
22 MR. CIRESI: Yes. I object to this as
23 being outside the scope of discovery and the scope of
24 the expert testimony.
25 THE COURT: Sustained.

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2512

1 BY MR. BERNICK:
2 Q. Dr. Robertson, do you know whether --
3 If you use only flue-cured product in
4 manufacturing cigarettes, would the pH be higher or
5 lower than what you'd have when you use a blend?
6 A. I would expect it to be lower.
7 MR. BERNICK: Okay. This would be a good
8 time to break, Your Honor, if it's appropriate.
9 THE COURT: Let's take a short recess.
10 THE CLERK: Court stands in recess.
11 (Recess taken.)
12 THE CLERK: All rise. Court is again in
13 session.
14 (Jury enters the courtroom.)
15 THE CLERK: Please be seated.
16 MR. BERNICK: Your Honor, could I raise a
17 brief issue at side bar for just a moment, please?
18 (Side-bar discussion commenced as
19 follows:)
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2514

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(Side-bar discussion concluded.)

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2515

1 BY MR. BERNICK:
2 Q. Dr. Robertson, I want you to turn for a moment
3 to -- from this discussion of how ifferent elements
4 of the recipe could affect pH to what the actual pH
5 values are for U.S. cigarettes. And as a groundwork
6 for doing that, I want to go back to 1960 and talk a
7 little bit about the use of ammonia in U.S.
8 cigarettes.
9 As I understand it from your direct
10 examination -- and I think I put this down right --
11 you believe that Phillip Morris began to use
12 ammoniated recon in about the 1965 time frame. Would
13 that be correct?
14 A. 1964, 1965, yes, in their products.

15 Q. In their products. And -- and continues to do
16 that today; right?
17 A. Yes.
18 Q. Just as a point of clarification, I -- I think
19 that you may have said this, but according to the
20 Reynolds documents, the use of ammonia by Phillip
21 Morris beginning this period of time -- and I'm now
22 going to show you Plaintiffs' Exhibit 1280 -- 12800,
23 which is at volume two, tab 67, and it's in
24 evidence --
25 A. Which page is that?

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2516

1 Q. This is --
2 A. Which page is that?
3 Q. This is the first, second -- the third page of
4 the document. At the bottom of it it has -- ends in
5 numbers 85 -- I think it's 0 -- 8510. 8510. I don't
6 know if that's the third page or not until I see it.
7 Are you with me?
8 A. Yes.
9 Q. Okay. And do you see where it says that "Philip
10 Morris introduced the use of added ammonia to their
11 cigarette products in 1965. They used diammonium
12 hydrogen phosphate in their reconstituted tobacco
13 process to liberate ammonium pectinate prior to
14 casting a reconstituted tobacco sheet."
15 Was it in fact your understanding, that
16 diammonium phosphate was used basically as part of an
17 effort to manufacture the sheet; that is, it was done
18 for a manufacturing-process purpose originally?
19 A. That's what is indicated by the -- the documents
20 that I read. This is the band cast process, and the
21 displacement of the calcium ions from the pectin
22 allowed the pectin to be mobilized.
23 Q. Okay.
24 A. And then, by the addition of ammonia, would
25 replace the calcium --

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2517

1 Q. Okay.
2 A. -- and then the sheet could be formed. That's
3 what the documents indicate.
4 Q. Okay. Now Reynolds, which would be next on my
5 list, if you turn to Exhibit -- Plaintiffs' Exhibit
6 13141 -- 13141, volume three, tab 69. This indicates
7 that Reynolds actually began -- it's already in
8 evidence as one of the --
9 This is one of the documents you showed the jury
10 on direct examination; right?
11 A. That's correct.
12 Q. Okay. This says that Reynolds actually started
13 working on ammoniation of tobacco back in the 1950s
14 but did not apply the technology, and that Reynolds
15 began to introduce ammoniated sheet -- you see down
16 at that last paragraph there -- in the Camel filter
17 product in 1974. Is that -- is that your basic
18 understanding?
19 A. Yes.

20 Q. So even though Reynolds was aware of the ammonia
21 technology, it didn't actually use it until the early
22 1970s, would that be fair, in sheets?
23 A. I don't know what they were doing in the 1950s
24 with ammonia or what they were finding --
25 Q. Okay.

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2518

1 A. -- or what technology they developed.
2 Q. And would it be also be fair to state that -- I
3 think you've indicated that this -- these moves,
4 Reynolds now responding to Philip Morris, are driven
5 by competitive envy of Marlboro; is that correct?
6 A. There's certainly a great deal of indication of
7 that in the documents, when you read the documents,
8 that RJR was tracking closely the developments at
9 Philip Morris.
10 Q. And Philip Morris -- I'm sorry. Have you
11 finished?
12 A. And responding to what they felt was the use of
13 ammonia technology in their -- in their -- in the
14 Philip Morris products.
15 Q. And Philip Morris wasn't sharing any of its
16 secrets. It wanted to keep on making money through
17 Marlboro, so Reynolds was trying to figure out what's
18 the secret to Marlboro. Fair?
19 A. That appears to be what was going on, yes.
20 Q. Now I forgot one that I should add in here, and
21 only did this because we're kind of on the same
22 document, but in fact The American Tobacco Company --
23 call it ATCo -- began to use ammoniation in the 1967
24 time period; correct?
25 A. That's right.

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2519

1 Q. Do you know how it came to pass that American
2 Tobacco started to use ammonium -- ammonia technology
3 in the late 1960s?
4 A. I can't -- can't tell you, because there's --
5 there were so few ATC documents available, it wasn't
6 possible for me to piece that together.
7 Q. Okay. Fair.
8 Now American, though, did not continue to use
9 ammoniated technology continuously over time; did it?
10 A. That I can't -- couldn't respond to without
11 going back and looking at the data.
12 Q. Well do you recall that from the period from
13 about 1976 all the way through the mid-'80s, American
14 just didn't use ammoniated recon in its products?
15 A. Again, I can't -- I can't verify that. But if
16 that was indeed the case, I don't deny it either. I
17 just don't -- can't verify that for you.
18 Q. Now Brown & Williamson began to use ammonia in
19 the mid-1980s in its recon; correct?
20 A. Yes. About in 1986, I believe.
21 Q. And the net result is you got all these
22 different companies -- Lorillard looked into it in
23 the '70s. When did Lorillard start to use ammoniated
24 recon?

25 A. I believe 1987.

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2520

1 Q. So this is an industry where nobody's helping
2 anybody else out when it comes to competing with
3 Marlboro. Fair?

4 A. Nobody else is helping anybody else with regard
5 to Marlboro?

6 Q. Yeah. Nobody else --

7 These are all companies that are vying to
8 compete with Marlboro, and they're doing it without
9 sharing the secrets that they think they're
10 developing among themselves; isn't that accurate?

11 A. Well first of all I think they're competing
12 amongst themselves across the board, and I think they
13 were certainly focused on -- on Marlboro initially,
14 and certainly Brown & Williamson was focused both on
15 Marlboro and RJR in -- in their documents. And it is
16 true the use of ammonia technology was staggered, as
17 we have it here, over the years.

18 Q. Do you know of anybody who really even today has
19 found out -- any other company that's found out
20 what -- what really makes Marlboro great as a taste?

21 A. Well I can't answer that directly other than
22 watching the other companies try to duplicate
23 Marlboro as closely as they can, both from a
24 chemistry and a perception point of view. And
25 it's -- as I said before, the manufacture of a

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2521

1 cigarette is a terrifically complex process. The
2 recipe goes far beyond ammonia and sugar, it goes all
3 to the various ingredients, how they're blended, how
4 they're cased, how they're flavored and how they're
5 packaged, and then ultimately to how they're
6 advertised and to whom they're sold. And it depends
7 on what market that you're selling it into if you're
8 interested in knowing how the -- how the product will
9 develop and will grow. So there's many, many aspects
10 of this that need to be considered.

11 Q. And the recipes are kept under lock and key;
12 right?

13 A. If the manner in which the Category II documents
14 have to be treated, which were the specification
15 sheets for cigarettes that had been manufactured in
16 the past, they appear to be, at least in the eyes of
17 the companies, extremely sensitive information.

18 Q. Now as a result of this what we see as a series
19 of companies beginning to use ammoniation, would it
20 be fair to say that you would have expected, just
21 very, very roughly represented, you know, ammonia
22 consumption in the industry, ammonia use would have
23 steadily increased over time as more and more
24 companies began to do ammoniation? Would that be
25 right?

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2522

1 A. That would be a reasonable statement. As we saw
2 by 1989, I think the value that was quoted was over
3 5,000 tons a year of ammonia products.
4 Q. Okay. Now I'm going to kind of draw a little
5 bit of a rough pH scale over there.
6 From time to time measurements have been taken
7 of the pH of smoke in different products; correct?
8 A. That's correct.
9 Q. And isn't it true that the measurement
10 techniques are variable; that is, there are actually
11 a series of different techniques for measuring pH?
12 A. Yes, there are different techniques.
13 Q. Okay. And do you know offhand how many of them
14 there are?
15 A. Well I can tell you the ones I know about.
16 There's one in which the material in the Cambridge
17 filter is extracted into water and the pH is
18 measured. There's another one where the Cambridge
19 filter is homogenized into a solution and the pH is
20 measured. There is another one in which the smoke is
21 passed over a pH electrode which contains a thin film
22 of buffered material on it, which was developed by a
23 scientist at RJR in 1967. There have been
24 measurements where the pH electrode is applied
25 directly to the pad and measurements are taken. And

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2523

1 then there is a technique that was used very early on
2 by Philip Morris, a technique where the smoke was
3 actually bubbled through a solution and measurements
4 were -- were made, and that same technique had
5 apparently also been explored in the 1940s by The
6 American Tobacco Company.
7 Q. Okay. Now -- and there's also --
8 Is it true that in any given set of tests that
9 get done, there's a variability in the results; that
10 is, the same brand can be tested with the same
11 technique and yield different pH results; correct?
12 A. Well are you talking about a sampling problem or
13 a measurement problem, or a difference here?
14 Q. Well both. I mean if you go into the -- into
15 the company documents, isn't it true that in -- in
16 one year for -- for -- for Marlboro, 1970, according
17 to a test one year, it may have a pH of 6.2, and then
18 according to a test done later on of the same
19 material, it may have a pH of 6.5? That there's
20 variability in the results that you get by applying
21 the same test to the same brand; isn't that true?
22 A. Well there's certainly --
23 I've seen variability, some variability among
24 methods and I've seen some variability among -- in
25 brands as time went on.

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2524

1 Q. Right. But when we're talking about --
2 We'll talk about variability over time and among
3 brands in a moment. All I'm getting at is there are
4 limits to the accuracy of the experimental technique;
5 correct?

6 A. Well if you're referring to the -- to an
7 experimental technique, it will have its own
8 reproducibility characteristics.
9 Q. Okay. Now I -- I want to focus a little bit on
10 tests that were done in 1974 and then move forward a
11 little bit to the present, more recent times.
12 I believe that one of the articles on which you
13 relied in your expert report is an article by
14 Brunnemann and Hoffmann in 1974. If you could take a
15 look at volume two, tab 38. TG352.
16 A. Okay.
17 Q. And is that in fact --
18 Are you with me there on the article?
19 A. Yes, I am.
20 Q. Is that an article that you read in what you
21 referred to as your reliance on publications which
22 you submitted?
23 A. I read this article, yes.
24 MR. BERNICK: Okay. We would offer this
25 into evidence, Your Honor, as Exhibit TG352, as a
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2525

1 learned treatise.
2 MR. CIRESI: No objection, Your Honor.
3 THE COURT: Court will receive TG352.
4 BY MR. BERNICK:
5 Q. We have the title page there.
6 A. Yes.
7 Q. Okay. And in fact, is it true that this is --
8 this reflects an article that was published in about
9 1974 by the named authors?
10 A. Yes.
11 Q. Okay. And is it also true that -- and I know
12 this is not the easiest thing to read -- that this
13 article discusses the pH of smoke from U.S. style
14 cigarettes, among others?
15 A. I'll have to refresh my recollection here. And
16 you're right, it's nearly impossible to read.
17 Q. Yeah. It's the best copy that we can get. This
18 is page 122. See where it says, "Cigarettes made
19 from bright tobacco or blend tobacco deliver
20 mainstream smoke below a pH of 6.2 and consequently
21 contain only small amounts of unprotonated nicotine?"
22 Is that what it is that the authors found in
23 reviewing the test results that they had done?
24 Do you want to take a look at the figures they
25 referred to? They're referring to other figures in
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2526

1 the article.
2 A. Well I can hardly read this. In fact I can't.
3 I don't know. Do you have a better copy, one
4 that I can read?
5 Q. I wish I did. See where it says, "Cigarettes
6 made from bright or blended tobacco deliver
7 mainstream smoke below a pH of 6.2 and consequently
8 contain" -- and the citation is to -- is to figures
9 five and six.
10 A. Figures five and six?

11 Q. Correct.
12 A. Okay. So there's data for two cigars, a Kent
13 reference cigarette, a blended filter tip cigarette
14 and a blended cigarette without filter.
15 Q. Right. And all -- I'm sorry.
16 A. And six, it's all European cigarettes except for
17 the Kent reference.
18 Q. Right. Four, five and six are the blended
19 filter tip without filter and the Kent reference;
20 right?
21 A. In figure five.
22 Q. Right. And that gives you the values that I'm
23 pointing to on the screen here, four, five and six,
24 these four, five and six.
25 A. Yeah. They're the curves toward the bottom

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2527

1 there, right.
2 Q. And that's where he says that the values that
3 you get in the summary are 6.2 or less; correct?
4 A. That appears to be the case, right.
5 Q. Okay. Now isn't it true that subsequently over
6 the years the Surgeon General has reported on the
7 values, the pH values of U.S. style cigarettes? For
8 example, in Exhibit JG113, which is the '79 report --
9 Do you still have the '79 report around there
10 someplace?
11 If you take a look at page 14-37 and 14-38 of
12 the '79 report. Do you see where the Surgeon General
13 in '79 says for a blended U.S. cigarette, the pH of
14 the mainstream smoke varies between 5.5 and 6.2?
15 A. Right. I don't know over what -- what -- what
16 that's referring to in terms of measurements, but
17 that's that it says.
18 Q. We don't know exactly what measurement technique
19 and we don't know exactly what it was that got
20 measured.
21 A. Or when it was measured.
22 Q. We got a range from 5.5 to 6.2; is that right?
23 A. That's what it says.
24 Q. Okay. And if we go to Dr. Benowitz in 1988, if
25 you take a look at volume one, tab 13, it's GI158.

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2528

1 A. Okay.
2 Q. Does he also --
3 Are you familiar with this article by Dr.
4 Benowitz, "Pharmacologic Aspects of Cigarette Smoking
5 and Addiction?"
6 A. No, I don't believe so.
7 Q. Never read it before?
8 A. Doesn't look familiar, no.
9 Q. Okay. I won't ask you about it. If we go to --
10 In order to kind of cut to the chase here, if we
11 go to present times, isn't it true that testing was
12 done in 1997 of a whole series of cigarettes from
13 different companies for the purpose of informing the
14 Massachusetts Department of Public Health? The
15 Rickerts study. Are you familiar with the Rickerts

16 study?
17 A. Yes.
18 Q. Okay. If you turn to your tab, volume one, tab
19 26, that's GK345.
20 MR. CIRESI: GJ?
21 MR. BERNICK: GK34 -- I'm sorry, GK100345.
22 Q. Is that the Rickerts report?
23 A. Appears to be, yes.
24 Q. Okay. And that was a report that you reviewed
25 in connection with your work on this litigation?
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2529
1 A. Yes. I've -- I've looked at this report.
2 Q. Yes.
3 MR. BERNICK: We would offer it, Your
4 Honor, as a learned treatise.
5 MR. CIRESI: It's not a learned treatise.
6 It's a report by the Massachusetts Department of
7 Health, Your Honor.
8 MR. BERNICK: We offer it as a government
9 report then.
10 THE COURT: Can you --
11 You'll have to lay some foundation for the
12 report then.
13 BY MR. BERNICK:
14 Q. Was this in fact a project report prepared for
15 the Massachusetts Department of Health for purposes
16 of determining the characteristics of existing
17 cigarette brands?
18 A. Well it's entitled "Partial Characterization of
19 10 'Common' Brands Of American Cigarettes." So it's
20 a project report prepared for the Massachusetts
21 Department of Public Health by a W. S. Rickerts, who
22 is associated with Labstat, Incorporated, Analytical
23 Services Division in Kitchener, Ontario, Canada.
24 Q. Okay. Is it customary for state departments of
25 health to ask specialized laboratories to do testing
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2530
1 with regard to products that they want to analyze?
2 Is that something that you're familiar with?
3 A. I don't have any direct knowledge of that, but I
4 presume it would be the case --
5 Q. Okay.
6 A. -- from time to time.
7 Q. And this again is something that you decided to
8 review in connection with your work on this case; is
9 that right?
10 A. Yes. This was made available -- available to
11 me.
12 MR. BERNICK: Okay. Again we would offer
13 it, Your Honor. I think it would probably qualify as
14 a --
15 Really we're offering it for two purposes; one,
16 we're offering it as a -- as a government report,
17 report prepared for a government organization, and
18 number two, for purposes that the witness has
19 reviewed it and obviously, therefore, it's relevant
20 in determining what knowledge he has concerning pH

21 values.

22 THE COURT: I don't know if we've quite
23 made it there, the fact that he's reviewed it.

24 MR. CIRESI: Your Honor, I --

25 THE COURT: Can you -- yes.

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2531

1 MR. CIRESI: I have no objection as a
2 government report, but it's a government report of
3 Massachusetts and --

4 MR. BERNICK: That's fine.

5 MR. CIRESI: -- I'm not sure there's been
6 the appropriate foundation yet for it.

7 THE COURT: Okay. Well if you have no
8 objection, it will be received as a government report
9 from Massachusetts.

10 MR. BERNICK: Fine.

11 THE COURT: Whatever that is.

12 BY MR. BERNICK:

13 Q. Okay. Dr. Rickerts has gone ahead and analyzed
14 the pH of a variety of brands; correct?

15 A. That's right.

16 Q. Do you see over on page 12 the results from the
17 analysis?

18 A. Yes.

19 Q. Okay. And I want to go through -- I'll be going
20 through them in a little bit more detail here in a
21 minute, but for the moment can we capture that he's
22 got a range of results going from a low of 5.98 --
23 this is 1997 -- 5.98 to about 6.35; correct?

24 A. Yes, for the cigarettes that he tested.

25 Q. For cigarettes that he tested.

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2532

1 Now if we just take a look at just the three
2 items that we've reviewed, Brunnemann and Hoffmann,
3 '74, which ranged from 6.2 and below, the Surgeon
4 General's report of '79, which ranged from 6.2 and
5 below, and Rickerts, which ranges from 6.3 and below,
6 have you been able to determine in this case that
7 there is any overall trend in pH values over the
8 years, or are we talking about something that is over
9 time relatively constant?

10 A. No, there's certainly trends with various brands
11 as was demonstrated with both Marlboro and Winston
12 over the period of time from 1970 to 1980.

13 Q. Okay. I'm --

14 A. And there are brands such as Now that have pH's
15 reported up as high as eight.

16 Q. Yeah.

17 A. And Kool, which has values in the sevens. So
18 this just isn't representative of all the pH values
19 that are out there.

20 Q. That's a fair point. I'm not asking you all the
21 pH values that are out there, I'm asking you for --
22 in terms of a range of where the -- where the cluster
23 of values is. We'll get to individual brands. I'm
24 asking whether, on an industry-wide basis, do we see
25 pH values increasing over time as we have seen

1 ammonia increase over time?

2 MR. CIRESI: Well I'm going to object to
3 the question as vague and overbroad. I'm not sure
4 what time period counsel is referring to.

5 MR. BERNICK: I'll tell you exactly, 1970
6 to 19 -- 1974, first point, to 1977.

7 Q. Do we see that as ammonia use has risen, that pH
8 has risen, or is pH in the aggregate remaining
9 relatively constant?

10 MR. CIRESI: Your Honor, then I would
11 object to the time period since discovery on the
12 underlying formulas was cut off as of 1994.

13 THE COURT: Well you may answer if you know
14 the answer to that.

15 A. Well the proposition that it remains constant
16 over time, based on my not having made that complete
17 analysis and this sparse data, I wouldn't agree to
18 that one way or the other, nor would I expect
19 necessarily -- I don't know what kind of correlation
20 I'd expect with pH and the amount of ammonia used
21 over time, because if you simply got more ammonia
22 going into more different brands of cigarettes as,
23 you know, for example. They're just two unrelated
24 variables, --

25 Q. Okay.

1 A. -- so --

2 Q. That's fair.

3 A. -- it is what it is.

4 Q. Maybe you've answered the question. It would be
5 fair to say that you have not determined as an expert
6 that there has in fact been any overall increase in
7 trend of pH within the industry over time, nor have
8 you determined as an expert that it's gone down. You
9 haven't made that determination. Fair?

10 MR. CIRESI: Objection, Your Honor, there's
11 no foundation. There's no discovery on that issue.

12 THE COURT: You may answer that.

13 A. Well what I have seen is that the pH values that
14 have been reported early on were around -- in the
15 lower five range and up to the mid fives, and then
16 there is values that go all the way up to -- to
17 eight. At least that's the range I've seen. And
18 certainly if you just take the Marlboro and Winston
19 over the 10-year period, 1970 to 1980, they
20 clearly -- the pH clearly rose over that time.

21 Q. Well Marlboro in that chart is at 6.028;
22 correct? Right?

23 A. When?

24 Q. Rickerts, 1997.

25 A. Oh.

1 Q. Right?

2 A. That's what -- that's what he -- that's what he
3 measured here, yes.
4 Q. Okay. If we go back to Claude Teague's memo in
5 1973, isn't it true that Marlboro at that time, at
6 least according to his memo, was much higher, was
7 above 6.2 or 6.3; correct?
8 A. Well the pH for Marlboro and other brands has
9 varied from time to time.
10 Q. That's why I'm asking.
11 A. It's gone up and it's gone down.
12 Q. All I'm asking you is can you make a statement
13 one way or another that there's been any overall
14 trend in the industry to higher, lower, or constant
15 pH's? "Yes" or "no," have you made that
16 determination?
17 A. No, I haven't made a specific determination of
18 that other than the ones that I referred to, which
19 were in the documents.
20 Q. Okay. Let's talk a little bit about, then, the
21 absorption, the absorption of nicotine.
22 Very dangerous to have me drawing here.
23 But you talked about the capillary membrane and
24 the bloodstream and that particle over here
25 someplace. Remember that?

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2536

1 A. Yes.
2 Q. Okay. Now would you agree with me that 90
3 percent -- roughly 90 percent of the nicotine in
4 cigarette smoke is absorbed in the lung?
5 A. I've seen data that would indicate anywhere from
6 40 to 95 or 96 percent has been -- has been reported.
7 The lower values, I believe, were reported for -- in
8 a study where there were non-inhalers, and the
9 preponderance of the values are in the -- are in the
10 90s, I would say.
11 Q. Again, this was what the Surgeon General
12 reported, I think, in the '83 report. Is it correct
13 that when it comes to inhalers, consistently the
14 literature has reported that 90-plus percent of the
15 nicotine is absorbed in the lung?
16 A. I -- that agrees with what I've seen. As I
17 said, it's -- I've looked at maybe 10 independent
18 assessments of that. But they are high, they are
19 around 90 percent.
20 Q. Okay. And I think you also have told us that it
21 takes between seven and 10 seconds for inhaled --
22 from the time of inhalation until the time that it
23 reaches the brain; correct?
24 A. That's what's been reported.

25 Q. Now let's assume the pH of 6.028 of the

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2537

1 Marlboro. Okay?

2 A. Yes.

3 Q. Can you tell me how much free nicotine is in
4 that aerosol particle if the pH is at 6.028?

5 A. Well what's normally done is to use the
6 Henderson Haselbach equation, which is represented on

7 your chart, to determine the fraction of -- of
8 protonated versus unprotonated material.
9 Q. And if we go down to six on the chart right
10 here, we're -- we're much pretty down to the bottom
11 of the Henderson and Haselbach curve; are we not?
12 A. I think you'll probably end up with a number
13 around one percent, something on that order.
14 Q. Okay. One percent free nicotine.
15 A. Well that's an approximation. We'd have to --
16 actually have to calculate it to --
17 Q. Okay. We'll just put down approximate.
18 Okay. Now once it gets into the bloodstream,
19 how long does it take for that nicotine to reach the
20 brain?
21 A. Well what I've learned, it's going to be on the
22 order of seconds.
23 Q. Seconds?
24 A. Yes. Not minutes, but seconds.
25 Q. Well how many of those seven to 10 seconds is
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2538

1 used up with the process of getting from that little
2 capillary up to the brain?
3 A. It depends on the blood flow rate.
4 Q. Well you tell me.
5 A. So --
6 Q. You -- you testified seven to 10 seconds. I'm
7 just asking you what portion of that is due to the
8 transportation from the capillary to the brain?
9 A. Well what I testified to, that it's been
10 reported that it's -- it's on the order of seven to
11 10 seconds for the transport in and to the -- into
12 the brain. I haven't broken it down.
13 Q. Would it be --
14 If it's seven seconds, would it be six of those
15 seven seconds, 6.5 of the seven seconds, three of the
16 seven seconds? Do you know one way or the other?
17 A. It could be different in different people. Like
18 I think it's in that range, but I can't give you a
19 precise number because there is no precise number.
20 Q. And in point of fact, overwhelmingly most of the
21 time of that seven to 10 seconds is spent
22 transporting the nicotine from the capillary to the
23 brain; right?
24 A. Certainly a portion of that is, yes.
25 Q. Well it would be --

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2539

1 If you don't know what the portion is, just tell
2 me. I'm just asking if you know.
3 A. Well it's going to be on the order of seconds.
4 Q. But you can't tell us beyond that how much.
5 A. No.
6 Q. Now I think you've told us that the free
7 nicotine comes off the aerosol and goes into the
8 vapor phase; right?
9 A. Yes.
10 Q. How long does it take for that one percent of
11 free nicotine to turn into 90 percent that's absorbed

12 into the bloodstream? How long does that take?
13 A. Well it depends. The residence time of the
14 particles in the alveolar spaces is thought to be on
15 the order of a couple of seconds. The equilibrium is
16 established in the range of milliseconds.
17 Q. Milliseconds?
18 A. The equilibrium is established on the
19 millisecond time scale, so it's just as -- the time
20 that would be involved was the time that it would
21 take to extract the -- the nicotine out of the
22 particles, and obviously the extraction is pretty
23 high because you get 90 percent across.
24 Q. Yes. So how do you get -- how long does it take
25 you --

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2540

1 You were talking very carefully yesterday about
2 milliseconds and time.
3 A. Uh-huh.
4 Q. How long does it take to get out of that one
5 percent of nicotine all the way up to 90 percent of
6 nicotine. You tell me. Is it milliseconds?
7 A. That would depend on the concentration of -- of
8 free base. That's the whole point.
9 Q. Okay. Well at a pH of 6.028 and one percent of
10 free nicotine, you tell me how many seconds or
11 milliseconds it takes for that nicotine to be
12 absorbed. Just tell me. Or tell me if you don't
13 know, too.
14 A. Well the -- the time scale analysis just simply
15 points out that that system is equilibrated, and the
16 amount of free base that's in the particle, which
17 depends on the pH, will set the concentration at the
18 wall of the capillary, which in turn will set the
19 rate.
20 Q. I know that. You told us.
21 A. So it's -- it's in -- really in relative terms
22 that one would -- that one would examine that.
23 Q. Not "will examine," I just really would like to
24 know if you know the answer.
25 6.028 pH, Marlboro, right off this report, tell

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2541

1 me how long it takes for the nicotine to get from the
2 particle into the bloodstream.
3 A. Well that's --
4 I haven't done that kind of a calculation.
5 Q. Okay.
6 A. What I've just simply said is that you can
7 understand the difference that is seen in small
8 changes in pH that result in concomitant changes in
9 the free base in understanding why it is under higher
10 free base conditions you get a more rapid transport
11 of that 90 percent.
12 Q. I'm not into changes in pH yet. I'm just asking
13 you about this pH, this particle, this brand. I want
14 to know -- I think you just told me --
15 Have you done the analysis of how long it takes
16 for that to be absorbed?

17 MR. CIRESI: Objection, asked and answered.
18 THE COURT: It's been asked and answered.
19 Q. Do you know of anywhere I could find that
20 number?
21 A. No.
22 Q. Have you looked at the experimental data that
23 exists on the subject of the time it takes to
24 absorb -- experimental data -- the time it takes for
25 nicotine to be absorbed into the bloodstream as a
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2542
1 function of pH? Are you aware of the experimental
2 data?
3 A. No. Can you show it to me?
4 Q. Sure, I could. I just wanted to know if you
5 know about it. You don't; right?
6 THE COURT: Well counsel, --
7 MR. CIRESI: Your Honor --
8 THE COURT: -- it's not appropriate for
9 counsel to comment. Please, if you have a question,
10 address it --
11 MR. BERNICK: Sure.
12 THE COURT: -- to the witness.
13 MR. CIRESI: I'm also going to object to
14 suggesting there is something without showing what it
15 is he's referring to.
16 THE COURT: All right.
17 MR. CIRESI: It's an improper form of
18 question.
19 BY MR. BERNICK:
20 Q. I now want to draw a different particle. Let's
21 pick another particle off. Let's pick off Merit
22 Filter 100 at 6.331. How much free nicotine is there
23 in that one?
24 A. Well I'd have to calculate it to -- to -- if you
25 want to make comparisons between those two.
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2543
1 Q. Okay. Well maybe we'll do an easier one which
2 is Camel filter is at 5.9. Certainly we know that
3 Camel filter at 5.9 is going to be even less than one
4 percent; right?
5 A. Well I told you that the one percent was an
6 approximation because I didn't calculate it. But if
7 it's 5.9, it would be less, and -- and the other one,
8 6.3, will be more.
9 Q. Now can you tell us what the time difference is,
10 how much faster the nicotine from the Marlboro at
11 6.028 reaches the brain from the time that it takes
12 the Camel at 5.9 to reach the brain? Can you tell me
13 what the difference is, if you know?
14 A. Well I can --
15 Q. Or is there --
16 A. Well I can tell you that the concentration
17 driving force which sets up the rate, is going to be
18 lower for the Camel in your example and higher for
19 the 6.331 because of the equilibrium that's set up
20 across the particle and the gas/vapor space.
21 Q. Do you know whether it is a millisecond

22 difference between the 5.9 and the 6.28, two
23 milliseconds, ten milliseconds, a hundred
24 milliseconds? Can you give us what it is?
25 MR. CIRESI: Objection, it's a compound
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2544

1 question. Also asked and answered.
2 THE COURT: Okay. You may answer that.
3 You may answer.
4 THE WITNESS: Okay.
5 A. All I can do is tell you that there would be a
6 relative difference between the two because the
7 concentration driving forces will be different in the
8 examples that you have -- that you've given, and it
9 will depend on the free base concentration that's
10 established in the equilibrium between the particle
11 phase and the gas phase.
12 Q. Given what you've said, can you tell us as an
13 expert that that difference between the 5.9 and the
14 6.028 would actually be perceptible to a real-world
15 smoker? Can you give us that statement as an expert
16 opinion?
17 A. I can only tell you that it would result in a --
18 all things again remaining equal -- a -- a relatively
19 higher concentration in the blood for the higher pH
20 versus the lower pH, and that concentration --
21 MR. CIRESI: Excuse me. Excuse me, Your
22 Honor. Your Honor, Mr. Bernick constantly is
23 gesturing, et cetera, when the witness is speaking.
24 I think it's inappropriate.
25 MR. BERNICK: I'm sorry, Your Honor. I
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2545

1 apologize.
2 THE COURT: Yes. Please, I would
3 appreciate it if all counsel would --
4 MR. BERNICK: Sure.
5 THE COURT: -- be careful with that.
6 Q. Can you tell us that the difference between
7 6.028 and 5.9 is actually perceptible to a real-world
8 smoker?
9 THE COURT: Counsel, you interrupted the
10 witness right in the middle of his answer.
11 MR. BERNICK: Oh, I got -- I got
12 sidetracked. I'm sorry.
13 THE COURT: I do think we should give the
14 witness the opportunity to answer completely.
15 A. I haven't --
16 No, I can't tell you the answer to that, because
17 all I can do is tell you that there's a relative
18 difference, and that will -- that in turn is the
19 physical and chemical basis for the differences that
20 are perceived when cigarette smoke free base
21 concentrations are changed in terms of a mechanistic
22 explanation of why this phenomenon occurs. In other
23 words, the 90 percent absorbed is the totality of the
24 absorption, but it doesn't tell you anything about
25 the temporal nature of the absorption, and it's under
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2546

- 1 the changing free base conditions that the temporal
2 nature of the absorption would be expected to change.
3 Q. But you can't tell us that there's a temporal
4 difference that would make a difference to a smoker;
5 can you?
6 A. Well the experiments to do that would be
7 experiments in which one would relate changes in
8 smoking pH, for instance, to some electrophysiologic
9 indicator where you could experimentally confirm that
10 that was indeed the case.
11 Q. Do you have those?
12 A. I've seen experiments done by Gullotta where he
13 has attempted to change the pH of inhaled smoke and
14 made electrophysiologic measurements using the PREP
15 test.
16 Q. Is the difference between 5.9 and the 6.028
17 perceptible to the smoker?
18 A. It may be, may not be. I can't tell you that.
19 Q. Okay. I'd like to go beyond these particular
20 data points and ask you about some other data points.
21 If we go back to Exhibit TG352, volume two, tab 38,
22 that's the Brunnemann Hoffmann paper.
23 A. Okay.
24 Q. Do you see --
25 Well let's begin with different stalk positions.

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2547

- 1 Do you see that according to this article -- and I
2 apologize, again, for the quality -- that different
3 stalk positions have different levels of pH?
4 A. That's true.
5 Q. Is it also true that there will be variations
6 from crop to crop in pH?
7 A. Well there will be different variations from
8 place to place and crop to crop.
9 Q. If you go back and take a look at Plaintiffs'
10 Exhibit 13155 at volume two, tab one -- tab 151. The
11 plaintiffs' exhibit.
12 A. Okay.
13 Q. That's a memo that you've talked about
14 periodically. It's a 1973 Teague memo; right?
15 A. Right.
16 Q. Doesn't this reflect --
17 This is a chart that I don't think has been
18 displayed to the jury. This shows pH over here, year
19 of manufacture over here, and it shows Kool are the r
20 X's and Salem are the circles; right?
21 A. Yes.
22 Q. And what we see is a lot of variation over time
23 even within a brand; do we not?
24 A. Yes. And you see that for Winston and Marlboro,
25 too, in the -- in the previous page.

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2548

- 1 Q. Well let's just take -- let's just take Salem.
2 A. Okay.

3 Q. In 1964 we saw that Salem had a pH, according to
4 these measurements, of about 6.1, and then went
5 higher and it came back down, et cetera, et cetera.
6 Now if the same smoker was smoking Salems during that
7 four-year period of time, does that smoker believe
8 that Salems have changed in their degree of
9 satisfaction or their degree of quality, or can he
10 tell about those crop differences?

11 MR. CIRESI: Your Honor, I'm going to
12 object to that. There's no foundation that he could
13 tell about the crop changes.

14 MR. BERNICK: Well let's do this one.

15 THE COURT: I don't think he's an
16 agronomist.

17 MR. BERNICK: I'll use this.

18 BY MR. BERNICK:

19 Q. Do you see in this one here that I've got on the
20 screen that in the same year, Pall Mall, Lucky Strike
21 and Camel all go up, and the next year they all go
22 down? Do you suppose that might be due to crop
23 differences from year to year?

24 A. Well I can't tell you what it's -- what it's due
25 to, and I don't know what the variability in those

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2549

1 measurements is. Could be due to any number of
2 things.

3 Q. Well I'd like --

4 There are crop differences from year to year;
5 are there not?

6 A. Sure.

7 Q. Okay. Are crop differences, because of the
8 nature of tobacco, are they going to produce greater
9 or lesser pH depending upon the nature of the crop?

10 A. That's certainly possible.

11 Q. Are you telling us that the nicotine transport
12 to the brain is going to lead to a perceptible
13 difference to the smoker as crops fluctuate from year
14 to year?

15 A. Depends over the pH range that they fluctuate
16 and if that's -- if that's the only explanation for
17 the fluctuation.

18 Q. I want you to assume that the only explanation
19 for the fluctuation is crop variation. Is it your
20 testimony as an expert that a smoker can appreciate
21 and feel and see in his experience the differences in
22 crops from year to year insofar as they affect pH?

23 MR. CIRESI: Your Honor, I'm going to
24 object to that. There's no foundation, calls for
25 speculation and conjecture.

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2550

1 THE COURT: Okay. The objection is
2 sustained.

3 BY MR. BERNICK:

4 Q. Do you have any basis as an expert, Dr.
5 Robertson, for being able to determine whether pH
6 fluctuations due to crop changes are perceptible to
7 the smoker? Do you have any basis as an expert to

8 address that issue?
9 MR. CIRESI: Same objection, Your Honor.
10 THE COURT: I don't think he's indicated
11 anything with regard to the perception of the smoker.
12 Rephrase the question, counsel.
13 MR. BERNICK: Maybe you're -- I'll rephrase
14 the question to try to capture that precisely.
15 BY MR. BERNICK:
16 Q. Are you able to say with any changes, be they
17 due to brand or crops or other causes, that any
18 changes in pH are actually perceptible to the smoker?
19 MR. CIRESI: Again objection, Your Honor,
20 it's outside the scope now of the expert testimony.
21 That was testified to by Dr. Hurt.
22 THE COURT: Okay. If you know the answer,
23 you can answer it.
24 A. No, I don't have an answer to that.
25 Q. Let's talk a little bit about sales. You've
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2551
1 said repeatedly that the companies were concerned
2 about maintaining their business positions. Do you
3 recall your testimony?
4 A. Yes.
5 Q. And I think that in particular you focused on
6 the company's research concerning pH as being driven
7 by their business concerns. Do you recall your
8 testimony?
9 MR. BERNICK: Sorry. Is this all right?
10 MR. CIRESI: You're fine.
11 Q. Do you remember you discussed that?
12 A. That's what the documents -- that's what the
13 documents say.
14 Q. Okay. Now what this reflects is that Marlboro
15 was gaining -- this is a -- this is a display from
16 the same document.
17 MR. CIRESI: Do you have a chart number,
18 please?
19 MR. BERNICK: Yes, it's Exhibit 15 --
20 13155. It's the same document, it is simply a page
21 blown up out of that document.
22 MR. CIRESI: May we have the page, please?
23 MR. BERNICK: That one you just turned to.
24 That one. Okay. With me?
25 Q. What we see is Marlboro was gaining market share
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2552
1 and Winston is losing market share; right?
2 A. Right.
3 Q. Do you know when RJR began to ammoniate Winston?
4 I think you told us the other day, but do you
5 remember that?
6 A. Right. I think it was 1974, I think, '5.
7 Q. '9, '80. 1980, '79 or 1980. Does that refresh
8 your recollection?
9 A. For Winston?
10 Q. For Winston. Camel was earlier. Here is
11 Winston.
12 A. I guess I don't -- I don't recall that for

13 Winston.
14 Q. Did you look and see whether --
15 Once Winston became ammoniated, did you look and
16 see whether it helped at all improving its market
17 share, or did its market share continue to decline?
18 A. Well I think, as I recall, that it -- there was
19 not a strong correlation with its market share and
20 that Marlboro had really obtained such a headstart in
21 the market at that point in time that there were
22 other factors, most likely, that would have entered
23 into this.
24 PH isn't the whole story. We're talking here
25 about a time period in the companies where they were
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2553

1 absolutely obsessed with this notion that pH was
2 terrifically important, and they related it to the
3 free base fraction that was -- that was created as pH
4 changed. This was -- this dominated the research and
5 development of these companies for years and years
6 and years. So it's very clear that these different
7 companies, working independently of one another,
8 coming to the same conclusion and making the same
9 ultimate actions, knew the importance of pH and its
10 relationship to the free base effect as well as other
11 effects that pH has on cigarette smoke. And then
12 during this period of time it was driven by the
13 Winston/Marlboro split in terms of the share of
14 market with -- with RJR trying to determine and
15 reverse engineer the Philip Morris product. So it's
16 evident from what went on in the companies, all of
17 them acting independently of -- of one another, that
18 this was simply extraordinarily key to being
19 competitive.

20 Now when someone starts ammoniating and changing
21 the pH, there's other ways to change the pH, of
22 course --

23 MR. BERNICK: Your Honor, I really object
24 to this long statement. I don't think it's
25 responsive to the question. I move to strike.

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2554

1 MR. CIRESI: Your Honor, he's asked about
2 market share and sales. I mean he asked an
3 open-ended question.

4 THE COURT: Yeah. I think the question was
5 pretty broad.

6 MR. BERNICK: Could -- could I have the
7 question, please, read back?

8 (Record read by the court reporter.)

9 MR. BERNICK: Very specific factual
10 question, Your Honor.

11 THE COURT: Sounded pretty broad to me,
12 counsel. I'm going to let the answer stand. If you
13 have another question, go ahead.

14 THE WITNESS: Well I wasn't finished.

15 THE COURT: All right. Well then finish
16 your answer.

17 A. So back to the story.

18 (Laughter.)
19 Q. Okay. What's the story?
20 A. Unfortunately it's not a story, it's a fact.
21 MR. BERNICK: Well now, Your Honor, --
22 A. So now --
23 MR. BERNICK: -- at this point -- at this
24 point I don't think we are anywhere close to what
25 happened to Winston's market share over time, and
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2555
1 I -- I -- I really think that at this point we ought
2 to at least get a factual answer, if the witness
3 knows.
4 THE COURT: I'm going to let him finish his
5 answer.
6 THE WITNESS: Thank you.
7 A. Now what's been missing in this discussion that
8 he and I have been having is this notion that these
9 tiny little differences in pH are sort of
10 insignificant and don't matter.
11 MR. BERNICK: Your Honor, at this point --
12 A. When you look at the data -- when you look at
13 the data, the amount --
14 MR. BERNICK: -- I object. I object, Your
15 Honor. The witness is now holding forth in a
16 commentary on the adequacy of an answer that he gave
17 under oath before this court. This is highly
18 improper. I move to strike the statement.
19 MR. CIRESI: Well look, Your Honor, if I
20 may, what's been improper is the gestures and the use
21 of inappropriate questions by Mr. Bernick. He's --
22 he's asked an open-ended question.
23 THE COURT: All right. I'm going -- I'm
24 going to allow him to finish the answer, although the
25 last sentence probably is not appropriate. Why don't
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CROSS-EXAMINATION - DR. CHANNING ROBERTSON
2556
1 you finish your -- your answer without commentary
2 about your relationship with the questioner, if you
3 will.
4 THE WITNESS: Oh. That was inappropriate?
5 THE COURT: Yes.
6 THE WITNESS: Okay. Sorry. So I leave him
7 out of it when I --
8 THE COURT: Leave him out of it.
9 MR. BERNICK: Just the facts, ma'am.
10 THE WITNESS: That's difficult to do.
11 MR. BERNICK: That's the nature of the
12 process, Dr. Robertson. If we could just focus on
13 the facts.
14 THE WITNESS: We are.
15 A. The -- the key point is that when you look at
16 the data where free base has been measured in smoke,
17 you find that even at -- at pH's as low as
18 4.8 -- we're using this equation -- you would expect
19 very, very little free base to be there, a tenth of a
20 percent or something. What you find in the -- in the
21 surrounding gas phase is free base fractions actually
22 measured of ten and 15 percent. And then you say,

23 well, why -- why is that? And the reason for that is
24 because the activity of the nicotine in these
25 particles is intensely high, and so it wants out of
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2557

1 these particles. And the activity coefficients that
2 are represented here are on the order of ten or more,
3 which means there's an amplification process. So
4 it's easy to fall into the trap of thinking -- the
5 chemical trap, as it were -- of thinking that small
6 changes in pH will result in very insignificant
7 changes in the free base, and the fact of the matter
8 is that's simply not true.

9 Q. Dr. Robertson, do you know what happened with
10 the market share of Winston after ammonia was added
11 in 1979? Did it go up, did it go down, did it remain
12 the same?

13 A. Well I know that Marlboro surpassed -- surpassed
14 it, as I -- as I recall, so I don't know if it -- I
15 think it --

16 I really don't know right now.

17 Q. Let's take Kool. Same document.

18 This shows that Kool's market share is going up
19 and Salem's market share is going down; right?

20 A. Uh-huh.

21 Q. Sorry?

22 A. Yes.

23 Q. Okay. And isn't it a fact that during this
24 period of time Kool didn't have any ammonia that was
25 being added by way of recon? True?

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CROSS-EXAMINATION - DR. CHANNING ROBERTSON

2558

1 A. As I said, if -- as I said in terms of what's
2 controlling pH, ammonia is one way to do it. It's
3 not the only way.

4 Q. Could you answer the question, please? Was
5 ammonia being added to Kool during this period of
6 time or not?

7 A. I don't have that in -- in my head, the years
8 that Kool had ammonia and didn't have it. I know it
9 has it.

10 Q. As of when?

11 A. Kool?

12 Q. Yes.

13 A. Some of the Kool products have ammonia in it.

14 Q. As of 1993; right?

15 A. As I said, I can't remember the -- the date.

16 Q. By 1993 Kool's market share also was on the
17 decline; was it not?

18 A. That I can't tell you.

19 Q. Do you know whether adding ammonia to Kool in
20 1993 has improved its market share?

21 A. I don't know the answer to that.

22 Q. Isn't it true that there are a variety of
23 brands --

24 Take Tareyton.

25 A. Who?

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1 Q. Tareyton, the Tareyton brand. Are you familiar
2 with the Tareyton brand?

3 A. Oh, Tareyton.

4 Q. Tareyton.

5 THE COURT: Counsel, I'm sorry to interrupt
6 you, but you have to ask your questions either at the
7 podium or, if you're using an exhibit, you may -- but
8 you cannot wander the courtroom.

9 MR. BERNICK: Okay.

10 THE COURT: That goes for all counsel.

11 BY MR. BERNICK:

12 Q. The Tareyton brand is an American Tobacco brand;
13 right?

14 A. I don't know that. I mean I don't have that
15 memorized.

16 Q. Have you taken a look to see what happened to
17 Tareyton's market share when it added ammonia in
18 1991?

19 A. Well as I -- as I told you once before, it's --
20 it's not necessarily so that market share is going to
21 follow pH. We have good evidence with Marlboro and
22 Winston that that happens, but there are so many
23 other factors that determine in the end market share
24 beyond pH.

25 Q. Do you know of any other ammoniated brand that

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CROSS-EXAMINATION - DR. CHANNING ROBERTSON

1 has significantly gained market share over time as a
2 result of the addition of ammonia; that is, it was
3 losing market share, you added ammonia, and it gained
4 market share? Can you identify one?

5 A. Well what I can tell you is that over that
6 period of time we've been talking, every -- every
7 company went to some form of ammoniation in some of
8 their brands, and the reason that they did that is,
9 in the face of the lowering tar and nicotine, they
10 had to do something to be sure that the nicotine
11 delivery stayed in that window threshold that we've
12 been talking about. One of the ways to do that is
13 the functional equivalent of changing nicotine in the
14 free base form. There are others. We've talked
15 about them in the last two days.

16 Q. Is it a fact, Dr. Robertson, that people in the
17 early 1970s, looking at the success -- I don't mean
18 to have my back to you, I apologize -- looking at the
19 success of Marlboro, developed a hypothesis that
20 Marlboro's success was driven by pH of smoke? Was
21 that the hypothesis that they had at the time?

22 A. The hypothesis, if you will, or the -- the
23 implication -- the suggestion was that the key -- and
24 that's in the documents -- the secret to Marlboro was
25 ammonia technology. And that -- that was pervasive.

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1 Q. Ammonia technology. But the hypothesis was that
2 the reason that ammonia technology worked was because
3 of pH; right?

4 A. That wasn't the only reason, but that was a
5 reason.

6 Q. That's the reason that's reflected in the
7 documents that you read from the early 1970s;
8 correct?

9 A. There were indications that they felt that the
10 ammonia also imparted certain taste characteristics
11 as well as changing the pH and, as a result of having
12 done that, provided additional free base to the
13 consumer. And in fact, the -- I think it was Brown &
14 Williamson in fact made extensive plots and
15 characterizations of many competitive brands relative
16 to the smoke pH in that timeframe and found a
17 correlation between the success of brands and pH
18 across the board. And this, of course, drove people
19 in the industry to consider ways in which pH could be
20 manipulated.

21 I -- I can't -- I can't convey enough to you the
22 intensity of the research and development efforts
23 that went on to make this happen in the industry.
24 Nobody knew this was going on. They didn't tell
25 anybody about it, and nobody who tried to figured it

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2562

1 out.

2 MR. BERNICK: Your Honor, I move to strike.
3 This is more editorial comment.

4 THE COURT: I think you've answered the
5 question.

6 THE WITNESS: Okay.

7 BY MR. BERNICK:

8 Q. Dr. Robertson, the hypothesis that pH was the
9 success of Marlboro, that hypothesis has never been
10 proven in the marketplace; true?

11 A. No, it's not true at all. That's what caused
12 this whole thing to happen. You only have to read
13 the documents and -- and -- and set this out in front
14 of you.

15 You don't have five companies in a
16 hundred-billion-dollar industry doing research and
17 development on ammonia technology and putting five
18 thousand or more tons of ammonia into cigarettes
19 because they think it's just a good thing to do.
20 There's a reason for this, and they know the reason,
21 and the documents explain very clearly what the
22 reason is.

23 Q. If I didn't tell you, Dr. Robertson, what the
24 brands were, could you predict from those pH numbers
25 in the 1997 Rickerts report what the most successful

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2563

1 brand would be?

2 A. I told you, it -- you cannot necessarily connect
3 market share at any given point in time with pH.
4 Look at what happened to Camel when they came out
5 with Joe Camel and started selling Camels to kids,
6 marketing it to kids --

7 MR. BERNICK: Your Honor, I move to strike.
8 And I'd like an instruction to the witness that these

9 editorial comments are improper and should not take
10 place in this courtroom.

11 MR. CIRESI: Your Honor --

12 THE COURT: The last answer was
13 non-responsive.

14 Q. Can you tell from the pH levels that are here,
15 if you didn't know the brands, Dr. Robertson, which
16 brand tastes best?

17 MR. CIRESI: Your Honor, I'm going to
18 object to the form of that question. There's no
19 foundation for that.

20 THE COURT: Well he can answer.

21 MR. CIRESI: He's asking him which one
22 tastes best?

23 THE COURT: You can answer it if you know
24 that.

25 Q. Can you tell?

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2564

1 A. It's an absurd question.

2 Q. It's an absurd question because pH doesn't tell
3 you what tastes best; right?

4 A. pH in and -- in and of itself, no, of course
5 not.

6 Q. And pH doesn't tell you what product is going to
7 be the most successful either; does it?

8 A. Not necessarily, no.

9 Q. And in fact what makes a product successful is
10 ultimately --

11 Isn't it a fact that the companies that are
12 pursuing this line of business, before they put a
13 product out in the market, they give the new product
14 to test panels to see how the test panels are going
15 to rate the product?

16 MR. CIRESI: Objection, it's compound.
17 It's also asked and answered.

18 THE COURT: It's repetitive, counsel.

19 MR. BERNICK: I don't remember asking that
20 one, but that --

21 THE COURT: I do remember you asking that.
22 It's repetitive. Move on.

23 MR. BERNICK: Okay.

24 THE WITNESS: Can I answer something
25 anyway?

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2565

1 (Laughter.)

2 THE COURT: Wait for a question.

3 MR. BERNICK: If I ask you the right
4 question, the answer is yes; right?

5 (Laughter.)

6 MR. BERNICK: Maybe we'll get lucky. We
7 got another ten minutes.

8 THE COURT: We're trying to get the right
9 question, counsel.

10 MR. BERNICK: Okay.

11 BY MR. BERNICK:

12 Q. Let's talk a little bit about taste. I'm going
13 to do another version -- I really apologize for --

14 I'm left-handed is the problem, Your Honor, so
15 when I go like this, I offend Mr. Ciresi.
16 MR. CIRESI: Oh, no.
17 MR. BERNICK: Which isn't difficult. I
18 also offend the witness.
19 THE WITNESS: You don't offend me.
20 THE COURT: I believe Mr. Ciresi is
21 left-handed. I doubt if he's sensitive to that.
22 MR. CIRESI: The only thing I'm sensitive
23 to is counsel keeps walking out from behind the
24 lecturn to write. I get the impression he's doing
25 that just to get out from behind the lecturn. But
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2566

1 please.
2 THE COURT: I can't criticize you for that.
3 Go ahead, counsel.
4 BY MR. BERNICK:
5 Q. We'll see.
6 Let's start with ammonia again. And now let's
7 talk about, as you have learned from the document,
8 let's talk about the effect of just adding ammonia on
9 taste as you've learned it from the documents that
10 you've read and that you've pointed out to the jury.
11 Isn't it a fact that when you add ammonia, there
12 are certain irritants in smoke that the ammonia
13 reacts with and helps remove?
14 A. Cuts both ways. Ammonia can react with
15 irritants, and ammonia -- say aldehydes or something
16 like that, and -- and ammonia can create compounds
17 that are -- are -- that taste poorly. I mean that's
18 a hugely complex issue and it's indeterminant as far
19 as I can tell. The manufacturers don't know what
20 will happen necessarily, and that's why you give it
21 to these taste panels to -- and sensory panels to see
22 if, having made a change, it's going to give you an
23 acceptable product.
24 Q. Right. Ultimately what counts is consumer
25 acceptance; right? That's the ultimate test?

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2567

1 A. I think for this -- for this industry, which
2 is, you know, based on a -- a recipe format, it is.
3 And you -- as I said yesterday, you -- you send these
4 cigarettes out to these taste panels, and if they
5 don't pass, you go back to the shop and you make some
6 changes in it until it -- until it works.
7 But there's nothing to indicate that ammoniation
8 was done to -- to create taste. Taste followed
9 ammoniation. And taste, we've seen that it had to be
10 masked, and that created problems as well as -- as
11 some positive issues as well.
12 Q. We'll get to the history in a moment. I just
13 want to try to complete my chart.
14 There are things in smoke called aldehydes, and
15 aldehydes can be an irritant; correct?
16 A. There are an incredible number of compounds in
17 smoke that potentially could be irritating.
18 Q. Let's begin -- let's begin with the aldehyde.

19 Are aldehydes in smoke?
20 A. Yes. They are known to be -- they are known to
21 be irritants.
22 Q. Okay. And does in fact ammonia, if present in
23 tobacco, react to help remove aldehydes in smoke?
24 A. They can react with aldehydes, yes.
25 Q. I'm sorry?

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2568

1 A. Yes, it can react with aldehydes.
2 Q. Now I think you've also told us that when you
3 add ammonia, all other things being equal, pH goes
4 up. And doesn't that have the effect of creating
5 what's called impact?
6 A. A higher pH?
7 Q. Yes.
8 A. Well according to your documents, the higher pH
9 is associated with a higher impact, which is
10 generally associated with the higher free base
11 concentration that's in the smoke with the free base
12 reacting with the nerve receptors that line the
13 throat, although I've heard impact also referred to
14 as a chest sensation. And we saw yesterday that what
15 it is is the association, this sensation people have,
16 the fact that the nicotine is on its way to the
17 brain. So it is part and parcel of this smoking
18 experience.
19 Q. Well let's talk a little bit about that. The --
20 the impact refers to a throat sensation; does it not,
21 a catch at the back of the throat on inhalation?
22 A. Not necessarily, no.
23 Q. In the company documents, you haven't seen
24 reference to the impact on the back of the throat?
25 A. I said it's in the throat region and in the

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2569

1 chest.
2 Q. Okay.
3 A. If you don't believe me, you can watch the RJR
4 tape and you can listen to them say that.
5 Q. That's fine. I'm not taking issue with that.
6 Now that's a sensation that's felt back there;
7 correct?
8 A. Actually it's a -- it's a pain receptor that
9 is -- that's triggered, to so --
10 I don't -- I don't know what the feeling is.
11 Q. Now the nicotine doesn't have to be absorbed in
12 the lung and travel to the brain before it has this
13 sensation in the back of the throat or chest;
14 correct?
15 A. Well maybe you don't understand this notion of
16 an associated response. The response happens here
17 first. That is what triggers the association in the
18 brain. And then the nicotine is absorbed and goes to
19 the brain.
20 Q. Let's get this down. There is a sensation in
21 the throat. We'll call it throat sensation. Is that
22 all right?
23 A. Fine.

24 Q. And that's actually a stimulation of what's
25 called the trigeminal nerve; correct?
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2570

1 A. That is a nerve in that area, yes.
2 Q. And then once that nerve, the trigeminal nerve,
3 starts firing away, the brain knows that there's a
4 sensation in the throat or the chest; right?
5 A. Yes.
6 Q. Well in the meantime the smoke is on the way
7 down into the lung; right? And there the nicotine
8 gets absorbed, and the nicotine itself makes its way
9 to the brain; right?
10 A. Correct.
11 Q. And this is called a central nervous system
12 effect. That's what we've been talking about with
13 the absorption; right?
14 A. Yes.
15 Q. And this is actually a peripheral nervous system
16 effect, it's a sensation.
17 A. Yes.
18 Q. Right?
19 I'm sorry?
20 A. Yes.
21 Q. Okay. And one of the qualities that people look
22 to in the smoking experience is whether they get that
23 catch at the back of the throat. It's part of the
24 smoking experience that people report on; right?
25 A. Yes. But it depends on why it is they look for

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2571

1 that.
2 Q. I just asked you whether this is something they
3 report.
4 A. They report it.
5 Q. All right. Now when you add sugar to the
6 formula, you've already told us that the expected
7 response is the pH goes down; right?
8 A. Well again, you're taking a hugely complicated
9 issue, because cigarettes involve many, many other
10 steps, so you're --
11 If you want me to accept this sort of as a
12 hypothesis, you would, in principle, think that when
13 the sugar is added, you'll have a -- a drop in -- in
14 the -- in the pH.
15 Q. Okay. And isn't it also true that that sugar
16 reacts with the ammonia and other chemical reactions
17 called Maillard reactions?
18 A. Maillard reactions are complex carbohydrate
19 chemistry reactions that occur with amine -- amine
20 compounds to create a whole suite of additional
21 chemical compounds that will be present in the smoke.
22 Q. In fact the chemicals that are created I'll call
23 pyrazines; right?
24 A. Well that's not the only ones that are made.
25 Q. Well that's what the companies always -- one of

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1 the -- one of the types of chemicals the companies
2 discuss being created as a result of this reaction;
3 correct?

4 A. That's one of the ones they discuss, yes.

5 Q. So where you have ammoniated recon that includes
6 both ammonia and sugar, one of the things that you
7 get is perhaps the reduction of aldehydes, another
8 thing that you may get is Maillard reactions; right?

9 A. In -- in principle, yes.

10 Q. Okay. And isn't it a fact that the Maillard
11 reactions lead to kind of a -- lead to kind of a
12 roasty toasty flavor; don't they?

13 A. I've seen documents that go both ways on this,
14 where the presence of pyrazines is a positive and
15 where the presence of pyrazines is not a positive.

16 Q. And where it's a positive, is the positive
17 described that you get Maillard reactions that lead
18 to a toasty kind of flavor?

19 A. I don't recall seeing it described as toasty
20 roasty, but I've seen it described as either a
21 positive or a negative on -- on the taste. And I
22 think they really don't know because there are so
23 many pyrazines. There's probably 20 pyrazines that
24 are in --

25 Pyrazines is not an individual; there are all

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1 kinds of pyrazines that are made.

2 Q. Isn't it a fact that -- I'll --

3 MR. BERNICK: This might be as good a time
4 as any, Your Honor. I'm going to go into another
5 area.

6 THE COURT: All right. We'll recess at
7 this time and reconvene tomorrow morning at 9:30.

8 THE CLERK: Court stands in recess to
9 reconvene tomorrow morning at 9:30.

10 (Court recesses.)
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